A Database Publication

THE MICRO USER

Volume 5
Number 10
December 1987
£1.25

All about the BBC Micro and Archimedes

FAMILY FUN
Game of the month: Santa v Snowmen

BEST BUYS
We pick out all the top-selling Christmas games

UTILITY
Speed up your typing with keyboard macros

MUSIC
Easier composing on the BBC Micro

HACMAN
BBC-B to Master: More conversions

Cheat routine for Archimedes Lander

EDUCATION
The BBC Micro's global classroom

SEASONAL SOFTWARE
six pages of reviews
"Play It Again, Sam"
KAYLETH
THE HUNT
WALL
SPY vs SPY
BBC
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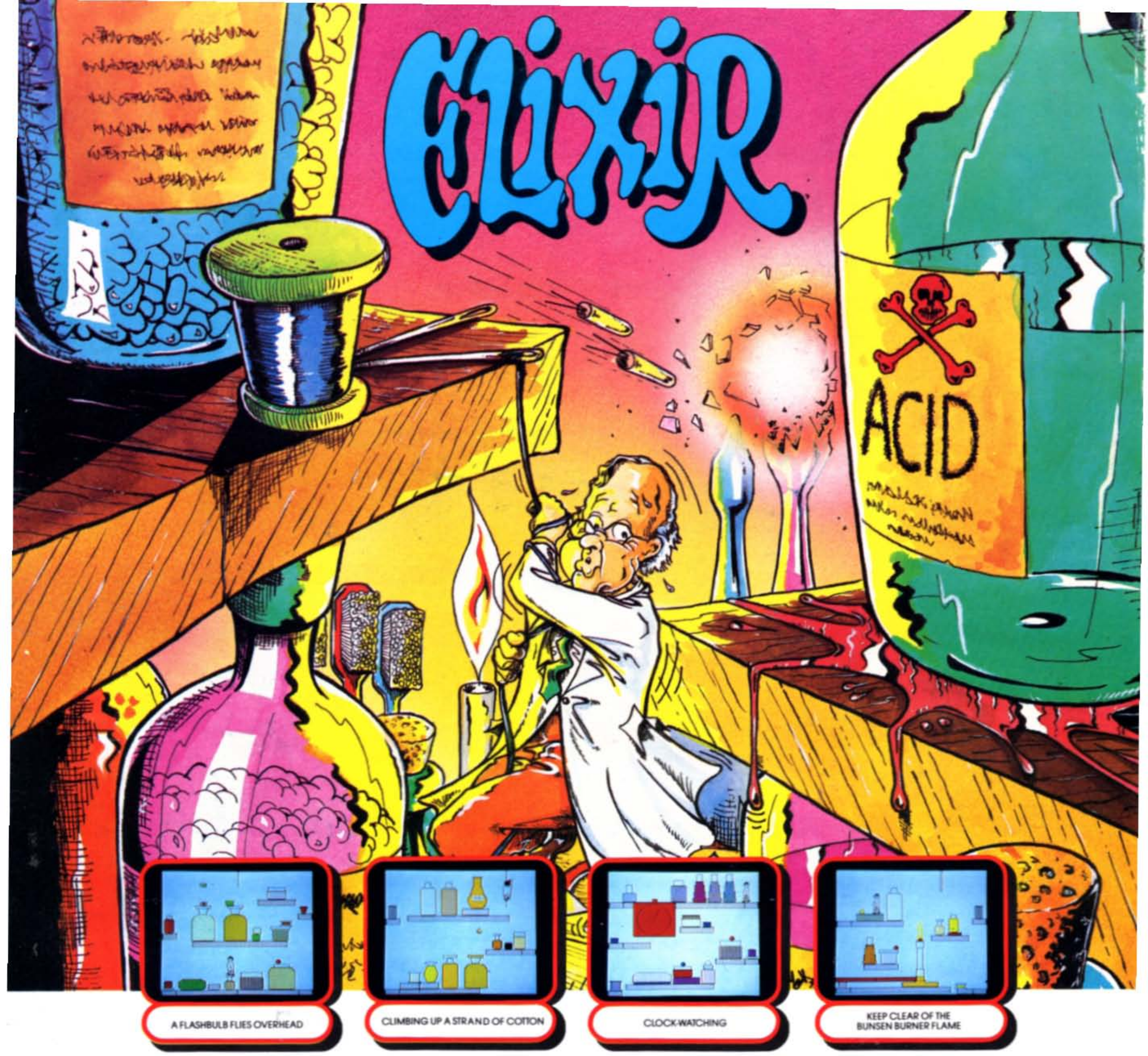

A FLASHBULB FLIES OVERHEAD

CLIMBING UP A STRAND OF COTTON

CLOCK-WATCHING

KEEP CLEAR OF THE BUNSEN BURNER FLAME

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The elixir just might restore you to your normal size... it's your only hope. But can you possibly reach it; you'll have to work out a suitable route by climbing up and down and across the shelves.

A fascinating, humourous game packed with strategical puzzles and problems. Keep clear of the lipstick missiles, leap over the exploding flash-bulbs, dodge the dripping acid, and watch out for the curious "circulasaurus" creature!

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The screen pictures show the BBC Micro version of the game.
The graphics of other versions may vary.

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Amx Times
SUPERART
STOP PRESS
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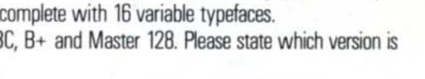
The AMX Mouse MK III costs only £34.99 or you can join the great "Mouse-Swap". Part exchange your old Mouse for the MK III for only £29.99.



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AMX MOUSE MK III PLUS SUPERART 16K ROM, PLUS DISC £79.99

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'Superart' features include cut, copy, paste, move, rotate, plus many, many more such as fantastic spray and zoom facilities.

Available for BBC B, B+; Master 128, and Master Compact. Please state which version is required when ordering.

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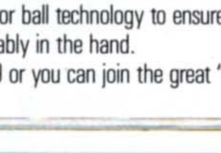

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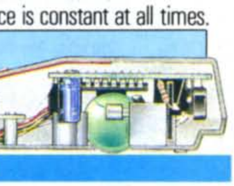

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THE MICRO USER
six pages of

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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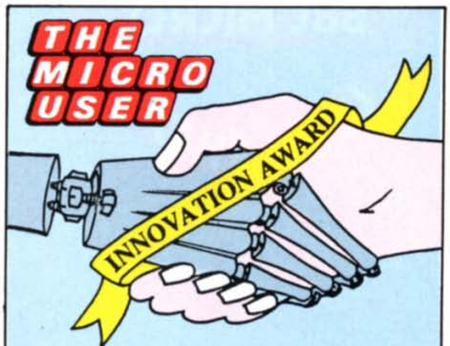

Your last chance for a preview of some of the amazing entries to this prestigious award appears on Page 28.

The lucky winner of the £1000 Archimedes super-micro will be announced at the Electron and BBC Micro User Show.

ELECTRON & BBC MICRO USER SHOW

Don't miss it. Full details are on Page 6.

MICRO USER CLASSIFIEDS

Save money on bargain offers from fellow readers – Page 91.

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REVIEWS
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THE MICRO USER

January 1988 issue on sale December 2

ELECTRON &
BBC MICRO
USER SHOW
Royal Horticultural Hall
Westminster, London SW1

SEE the first software, hardware and books for the Archimedes from companies like Acornsoft, Clares, Minerva, Computer Concepts, and many others.

BUT THAT'S NOT ALL!

- ★ **Hardware and software galore for BBC Micro and Electron owners**
- ★ **Lots of bargains for the BBC Micro and Electron at rock-bottom prices**
- ★ **Technical advice from the experts over the whole range of Acorn machines**

10am-6pm, Friday November 13
10am-6pm, Saturday November 14
10am-4pm, Sunday November 15

Here's your personal invitation to try out the revolutionary Archimedes for yourself

Be one of the first to play Zarch, the spectacular new game that is the first to make use of the Archimedes' incredible speed to magnificent effect – the four-directional scrolling really has to be seen to be believed!

Come along and meet the author, David Braben, creator of Elite. Try your hand at the game itself . . . and prepare to be amazed!

All this – and much, much more – at the 17th record-breaking Electron & BBC Micro User Show.

Here's just some of the exhibitors who have booked so far:

Advanced Computer Products
Advanced Memory Systems
Amten
Alan Preston Software
Argus Specialist Publishing
BBC Software
Beebugsoft
Bowthorpe EMP
Care Electronics
CDS Software
Centec Electronics Systems
CJE Micros
Computer Bookshops
Computer Concepts
CPM
Dabs Press
Database Publications
Dataphone
Direct Disk Supplies
Disking International
Electro Music Research
FSoft Computing
Gultronics
High Level Algorithms
Home & Business
HSV Computer Services
Impact Posters
JB Software
Kansas City Systems
KKS Electronics
LCL Educational Software
Meedmore Distribution
MicroLink
Micro Media Computer Supplies
Micronet 800
Micropower
Minerva Systems
Miniature Tool Company
Norwich Computer Services
Opus Supplies
Peartree Computers
Permanent Memory Systems
Pineapple Software
Rams Computers
R & A.J. Preston
Redwood Publishing
Slogger
Solidisk
Superior Software
Technical Advice
Tynesoft
Twillstar Computers
Video Electronics
Viglen
Vine Micros
Watford Electronics
Wight Scientific
Weserve
Wigmore House
Zonefour

Bring this coupon to the show to get 50p per person off the normal admission price of £3 (adults), £2 (children).

ELECTRON & BBC MICRO USER SHOW

50p OFF

10am-6pm, Friday, November 13
10am-6pm, Saturday, November 14
10am-4pm, Sunday, November 15

Royal Horticultural Hall,
Westminster, London SW1

A181

THE MICRO USER NEWS

Archimedes price cut by £100

WITHIN months of the launch of the Archimedes, Acorn has added another model to the range – and cut the price by £100.

The addition is the 310M, which is supplied complete with MSdos, will cost £835, or £885 with a mono monitor and £1,035 with colour.

Acorn (0223 214411) says that the market response to the new machines following the initial product announcement has allowed the company to finalise its manufacturing plans. This has resulted in cost savings which Acorn is passing on to buyers.

The company believes it has strong signs that the Archimedes will be ordered in bulk by a large number of users.

"This has the benefit of making the machine increasingly attractive and a cost-effective solution to market needs in areas where we have not been a major supplier", said a spokesman. "The new 310M is another demonstration of the enormous power of the Archimedes system".

"In using software to emulate a PC environment the ability to implement standard MSdos 3.21 is created. Thus the machine can run popular business software. As other systems become available, we will respond to our customers' needs"

Top moves

CLOSER links between Acorn and Olivetti have been forged with some new board appointments.

Mr Filippo Demonte, senior vice president, Olivetti Personal Computers, and Mr Luigi Pistelli, senior vice president, Olivetti Systems and Networks, have both joined the board of Acorn Computer Group plc.

Acorn managing director Mr Brian Long said that a close involvement with Olivetti's two major product development divisions was very important to his company as it developed its workstation products.

"Over the past year we have had a close relationship with these two heads of their divisions.

"Their presence can only increase the prospects of our technology and products being used by Olivetti. Their years of technical and commercial experience is also an obvious benefit to us".

HI-RES GRAPHICS

A NEW graphics package for the BBC Micro – Illustrator – has been released by Nidd Valley Micro Products (0937 844661).

Illustrator has been produced to complement NVMP's Digimouse. The graphics development program produces high resolution printouts in a choice of four sizes and two densities, with no loss of detail or distortion.

The print option has been designed to allow illustrations to be incorporated into word processor text.

Certain Illustrator functions have been assigned to the function keys which provides greater flexibility when using the mouse.

Some of the other features include zoom, flip, circle, ellipse, lines, multilines, ray, fill, sector, curve, polygon, and rotate. Price £19.90 for the Illustrator software or £49.90 with the Digimouse.

New genie pops up

NOW that Permanent Memory Systems has let the Genie out of the box, Genie Junior is about to emerge too.

The original Genie program for the BBC Micro is a rom based desk utility with calculator, notepad, phonebook, address book, calendar, and desk diary.

Genie Junior boasts the same features as the earlier version, but instead of being entirely hardware based it uses rom and disc to run the program.

Derek Mathieson has rewritten the original 32k of Genie code and divided it between a 16k rom and disc.

By using special data handling routines PMS (03552 32796) has devised a system which is compatible with DFS, ADFS and single and double density systems. Price £25.

Adventures updated

NEW disc versions of the adventures Countdown to Doom and Philospher's Quest have been prepared for BBC Micros and Masters by Topologika.

Both have been revamped to provide more puzzles and extra locations.

Written by Peter Killworth, Countdown to Doom was highly popular in its original tape version.

Topologika (0733 244682) say the original theme remains. A ship has been grounded on Doomawangara, damaged and threatened with total disintegration in the planet's corrosive atmosphere. Players have to repair it in time, and collect treasure along the way.

Killworth was also responsible for Philosopher's Quest.

Both games cost £17.50 complete with starter guide and help sheets.

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Some of the fonts available are shown here:

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This is ITALIC
This is GOTHIC
This is COMPTS
This is BOLD
This is SHADOW
This is OUTLINE
This is BRDWAYE
This is THEATRE

CJE Welcome EXPORT and TRADE ORDERS – inquire for delivery costs.
Phone/Credit Card and Official Orders are accepted. Please ring for all the latest information and prices on 0903-213361.

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("Good value . . . Useful buy")
BEEBUG MAY 87.

Fontaid is a must for any Canon or Kaga Taxan owner. 60 predefined fonts are available or you can design your own. A Star NL10/NX15 version is also now available, so inquire for further details.

"Impressed... Delightful Simplicity... Easy to use"

(MICRO USER JUNE 87)

INFORM from CJE Micro's.

This unique sideways RAM information system is quick, versatile and simple.

NOW – Solidisk 256K version is also available.

Master Writeprotect/ROM select switch.

"I cannot praise it enough . . . Worth buying!!" MICRONET 800116575

This switch system selects RAM protected, RAM unprotected or ROM. Each bank is separately switchable. This is the MOST POWERFUL switch unit available at only £15.00 inc VAT. (p & p £1.00 extra).

CJE micro's

CJE Micro's (Dept MU12), 78 Brighton Road, Worthing, W. Sussex BN11 2EN. Tel: 0903-213361.

SOFTWARE PRICE LIST

All prices include VAT, but please add £1.00 for postage/packing and state 40, 80 track or 3½" ADFS when ordering.

MFNLQ	**£30.00**
Font Discs B, C & D each	**£15.00**
Fontaid	**£30.00**
Fontaid with 6264 RAM	**£36.00**
Font Discs A, B, C, D, EA & Lang each	**£15.00**
Inform	**£20.00**

PRINTERS

Delivery on all printers is free. Ring for a sample printout, specification and the latest prices.

The following Near Letter Quality printers all come with centronics interface, friction and tractor feed.

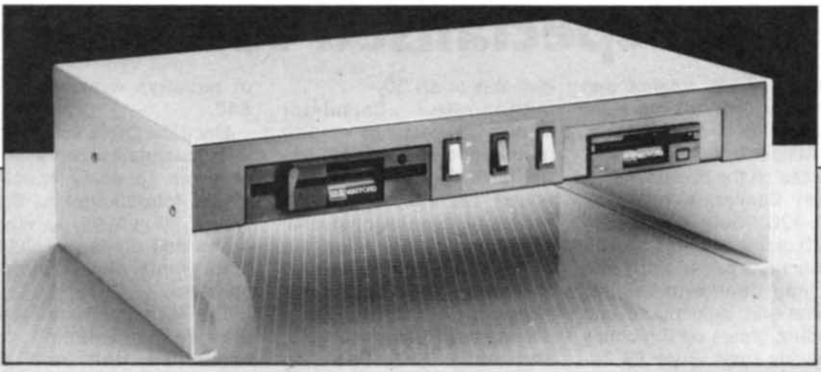
Panasonic KXP1081	**£180.00**
Canon PW1080A	**£260.00**
Star NL10	**£230.00**
Star NX15	**£410.00**
Star NB24/10 (216cps)	**£599.00**
Juki Daisywheel	**£330.00**

Free delivery on printers

CJE Printer packs

The CJE packs include; Cable, delivery, paper, plug, utility software and booklet. Please ask for further details.
The Printer packs cost £15.00 with printer: e.g. NL10 + pack = £260 + £15 = £275 inc. VAT.
BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

NEWS



Multi disc drive

TO solve the compatibility problems between the BBC model B, Master Compact and Archimedes discs, Watford Electronics has released a combined 5.25 and 3.5in disc drive unit.

Managing director Nazir Jessa, told *The Micro User:* "We have had a lot of enquiries from customers asking if we would produce such a unit because they wanted to share data between machines of different disc sizes".

The unit, DP35-800S, which is housed in a monitor stand plinth, contains a 5.25 40/80 track drive and an 80 track 3.5 inch disc drive with their own power supply. Price £175.

Watford Electronics has also announced that it is to release an upgrade of its Quest Mouse art package.

The new art extension rom is to be known as ConQuest and adds a number of features to Quest which include distortion of cut out to any angle, rotation, font designer, and built-in default brushes and patterns.

When used with sideways ram, two images can be displayed on the screen. On the BBC Master or when used with a GXR rom additional features include ellipses, arcs, sectors, segments and built-in printer drivers. File names can now be selected from the screen by using the mouse. Price £25.

Pakistan schools buy BBC

FIVE hundred BBC Micros are being installed in schools in Pakistan in a move which could open up the Indian subcontinent to British software houses.

Interface, the Karachi computer company, arranged for the shipment to the Sind province of Pakistan where each of the regional government's 100 schools will receive a batch.

Now Interface (010-92 21-515162) is looking for software support for the introduction of technology to these schools.

"We believe there is enough of a market here now to make it worthwhile for British software developers", said a spokeswoman.

New products line up for the big show

MORE exhibitors have released details of the new products and bargain offers they have lined up for the Electron & BBC Micro User Show.

Slogger is launching a 1Mb ram disc which will operate both DFS and ADFS on the BBC Micro and Master.

Permanent Memory Systems is launching a new office utilities software package.

Beebug Soft has three new products and is demonstrating a fourth.

They are a stand-alone C programming package that generates code which can be used on a BBC Micro without the C language being present, a new command rom for Hayes modem compatibility, and a BBC Master version of the X12 machine code monitor with extra features.

A new internal modem for the BBC Master, due to be released shortly after the show, will be on display.

Video Electronics says it will be launching several new video products for the BBC Micro, Master and Archimedes.

Wight Scientific is launching a BBC Micro version of Label Writer and giving away a free Christmas font with every Sign Writer program sold at the show.

Meedmore Distribution is selling its analogue steel shafted joystick for the BBC Micro at a new low price.

Home & Business is offering 25 per cent discounts off the regular prices of its colour and green screen monitors.

Bowthorpe has special show offers on its Apollo 410 four-way multi strip socket, Surge protector plug and Surge protector adaptor.

All these are in addition to new products and bargains already announced by leading suppliers like Watford Electronics, Minerva Systems, Centec, Pineapple Software, and BBC Soft.

A major highlight of the show is a special hands-on demonstration of Zarch – Superior Software's new search and destroy game for the Archimedes.

A large section of the stage has been set aside for a continuous presentation of the program's colourful 3D graphics.

The show, at the Royal Horticultural Hall, Westminster, is from November 13 to 15.

A money-saving ticket offer appears on Page 6.

More in the bank

AN upgrade of the Bank Manager program for the Master Compact has been released by Contex Computing (02303 347).

The latest release of Bank Manager Master now includes additional support for ADFS and Winchester hard discs. It allows a parent directory to contain one copy of the program files and 16 sub-directories, each holding its own set of files.

With 36 bank accounts per set, and 16 sets, up to 576 separate bank accounts may be held on line in one parent directory, and further directories can be created as required.

An automatic menu display is activated when more than one sub-directory is in use. The same menu can be called upon to switch sets of files during a session. Price £22.50 and £3 for an upgrade for present users.

NEWS

Rom gets a facelift

A POPULAR word processing rom for the BBC Micro has been given a major facelift.

Interface Electronics (07555 7286), in conjunction with Computer Concepts, has produced Wordwise Plus II.

It is now 32k long and features more than a dozen extra control functions including Delete Line, Mark Paragraph, and Find String.

A disc is included which provides a mail merging program, label printing and other utilities.

It costs £53.95, with discounts available for owners of earlier versions.

Database

TELETEXT software specialist Odyssey has released a product which helps users to set up a large database of pages.

TeleFax runs on Amcom E-net networks, and once the database is set up a page can be called by a single command from anywhere in the network.

The menu-driven system has a full screen editor, comprehensive display facilities and runs on the BBC Micros and Master. Price £30.

On the farm

FARM management consultancy Dixon and Dixon has produced its first product for the Archimedes.

Farmcash is an adaptation of the firm's existing BBC Micro accountancy package and only needs a single disc drive to function.

The module covers bookkeeping, VAT on invoicing, budgets and stock control there are extensive reports on screen and printouts are available as required.

Farmcash for the Archimedes series costs £200 from Dixon and Dixon (091-2853 042).

More specialised software

A BATCH of new finance and calculation software has been released for the BBC Micro and Master by W.L. Computer Services on the Room 7 label.

Easy Banker, says W.L.C. (051-426 9660) handles up to 20 accounts and 1,000 transactions per 40 track disc and can deal with regular income and expenditure and standing orders on a monthly or weekly basis. Price £8.

Pools Cheque is designed to provide a check for pools results against a weekly perm and to print out the results. Available at £8.50.

All-in-rate Calculator calculates costs to employ rates, price £15, while Electronic Price Book, at £45, allows operators to control and store their own personal price book and print out copies. An extended version is available at £95.

Pocket Engineer, at £30, is designed to calculate steel and timber beam sizes in homes, while Central Heating Calculator takes in room sizes and types including outside walls and calculates the size of radiators required. Price £45.

Electrical Cable Selector, at £45, calculates cable sizes required to carry specific loads; Introduction to Statistics, at £9.95 is menu driven and draws pie charts, histograms and frequency polygons.

The Investment Analyses analyses unit-linked life assurance, unit trust and share investments for up to ten years, price £18.95. An enhanced version is available for £25.

Cash flow facts

Cash flow information spanning 330 years will be possible with a forthcoming "world first" programmable spreadsheet management system for the Archimedes, says Minerva.

System Sigma, due out early next year, will continue the strong backing given to the new machine by Minerva (0392 37756). It is designed to be as friendly as possible, with the user deciding which specialised functions are available in what form, and "ordinary" words being used as commands.

It will offer a spreadsheet of 2,000 by 16,000 cells and will be fully compatible with Minerva's System Delta database and System Gamma graphics package.

You're in charge

FOR employees who think that they could run the business better than the boss, a new business simulation game for up to four players – Beat The Boss – has been released by RBRC.

The game puts the player in control of Fothergale & Co, manufacturers of disposable shirts, over an uncertain five year period of the British economy. The objective is, by clever management, to maximise profits and to earn larger cumulative profits than the boss.

The game is self-contained and can be played without reference to the tutor's guide. The five year period takes about 2.5 hours to play but can be saved at the end of each year.

It costs £30 from RBRC (01-946 8641).

MORE IN THE TOOLKIT

A WHOLE new set of features has been added to produce the final release version of Clare's Archimedes Toolkit.

Late additions include a series of ADFS utilities to give sophisticated editing functions in Ascii, bit, hex, text, word and even disassembly. Other commands include FIND, CATALL, EXALL, SWAP and VIEW.

Emulator

A SOFTWARE device for emulating a processor has been introduced by Lancaster Consultants (0524 65179).

Ice-King turns the BBC Micro into a development system for 6502-based target computers. It consists of a 2764 eprom and a pad with a flat cable which can plug into any sideways rom socket.

Ice-King enables the BBC Micro to run single-step or break-point programs which can be resident either in the BBC Micro's own ram or in the target system's rom.

In single-step mode the system gives a full display of both the next instruction to be executed and the processor's registers. An interrupt is signalled to the user by a change of colour. In free-run mode the system responds to normal interrupts. Price £250.

Analyser

A BBC Micro version of its successful Micro-Voice package has been released by R & D Speech Technology.

Features include real-time Fourier analysis of incoming speech and straightforward routines which allow hands-free operations in a wide variety of applications. It costs £99.

RISC USER THE ARCHIMEDES MAGAZINE AND SUPPORT GROUP

A BRAND NEW SUPPORT GROUP HAS BEEN LAUNCHED FOR THE ACORN ARCHIMEDES COMPUTER

RISC USER is written by an experienced team of Archimedes enthusiasts with roots in home computing, education, and over 5 years experience with the BBC Model B and Master computers with BEEBUG magazine. So popular is BEEBUG that membership exceeds 20,000 worldwide.

RISC USER provides lively and informed coverage of what's happening in the world of the Archimedes. Reviews, hints, programs and articles are specifically written for the Archimedes, showing how to exploit the many features of this sophisticated computer. RISC USER has material of direct use to education, business, industry and home computing.

RISC USER includes a well balanced selection of the latest news from Acorn and other major suppliers, pre-release reviews of the latest software and peripherals, as well as editorial features, ideas, hints and tips, readers letters and much more. RISC USER is published 10 times a year and is only available on subscription.

RISC USER subscription also gives you free access to our technical support team who may be contacted by phone or letter. This team of experts will endeavour to resolve any software or hardware problems that you may have, and will also provide unbiased advice. RISC USER is also an Acorn appointed Archimedes Support & Service Centre should you need repairs etc.

Although the focal point of RISC USER is the Magazine, remember that you get far more than JUST a magazine when you subscribe. You become part of an organisation which has provided many years of support to micro computer users. Let us have the opportunity to help you make the most of your Archimedes.

The first issue of RISC USER included the following:
ARM ADFS Menu – a useful utility to access ADFS files & directories under mouse control, *Visual Effects* – some Basic routines to produce stunning effects, *Sound & Music* – how to use the sound system, *Off The Shelf* – reviews of products available now, *Acorn Hotline* – using aliases and details of the OS, *Archie's White Mouse* – the first in a series on Archimedes graphics, dozens of vital *Hints & Tips* and much, much more.

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NEWS

The silent solution

A DEVICE which allows computer game players to run their favourite BBC Micro and Master programs without disturbing the rest of the household has just been released.

Chasing those high scores without fear of complaint has been made possible through SoundMaster, which costs just £14.99 from Database Electronics (061-480 0171).

The package includes a special interface encased in tough plastic with a graded volume control. It connects easily inside the computer and is supplied with all necessary leads.

The beautifully constructed Ross stereo headphones are fully guaranteed. They come with a special adapter which allows them to deliver crystal clear reproduction with personal stereo or hifi systems, too.

Every SoundMaster is supplied in a colourful presentation pack with detailed instructions.

Archimedes – PC network card

AN expansion card which can set up a mixed computer network has been released by Acorn.

The company sees one of the main advantages of this as hooking up an Archimedes to a PC network so that jobs can be completed more quickly.

The Acorn PC-EcoLink card allows PCs running under MSdos to make use of the Econet local network system.

"Users of EcoLink cards will benefit in two ways", says Acorn (0223 214411). "Firstly they will be able to construct networks for less than half the price of other systems offering comparable performance.

"The other major benefit is that the use of an Econet network will allow a mixed environment of MSdos PCs and Archimedes and BBC Masters to make use of the same text and application data files".

Price, including MSdos format disc and manual, is £299.

Domesday connection

A new software package has been released which is claimed to greatly increase the versatility of the BBC's Domesday system for business and education users.

DataMerge transforms the system into a flexible business tool, which enables a user's own data to be combined with the huge Domesday database.

With DataMerge figures can be graphed, product distribution plotted, or market penetration of various brands compared.

DataEditor is used for inputting and updating data values, or their transfer from another computer. DataFormat is utilised to convert downloaded data from video discs, data from another machine, or data provided from scratch.

The final element, DataDisplay, is an enhanced version of the Domesday software with the ability to access data from a floppy disc as well as the Domesday video discs.

All of the system's facilities are available for the user's datasets, including correlation of two datasets and display at various resolutions or over video background maps. Price £399 from BBC Enterprises (01-576 0521)

THE GALLUP CHART TOP 20

BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	TAPE PRICE
1	◁ 1	**GRANDPRIX CONSTRUCTION SET** *Superior*	9.95
2	●	**PALACE OF MAGIC** *Superior*	9.95
3	▽ 2	**SPY VS SPY** *Tynesoft*	9.95
4	△ 5	**CRAZEE RIDER** *Superior*	9.95
5	△ 7	**PHANTOM** *Tynesoft*	7.95
6	▽ 3	**DUNJUNZ** *Bug-Byte*	2.99
7	△ 13	**PAPERBOY** *Elite*	9.95
8	▽ 6	**SUPERIOR COLLECTION VOL 1** *Superior*	9.95
9	△ 10	**COMMONWEALTH GAMES** *Tynesoft*	6.95
10	△ 20	**MINI OFFICE II** *Database Software*	14.95
11	●	**LIVING DAYLIGHTS** *Domark*	9.95
12	▽ 8	**AROUND THE WORLD IN 40 SCREENS** *Superior*	6.95
13	●	**SURVIVORS** *Atlantis*	2.99
14	▽ 4	**CODENAME DROID** *Superior*	9.95
15	▽ 9	**MICROPOWER MAGIC** *Micropower*	7.95
16	◁ 16	**STRYKER'S RUN** *Superior*	9.95
17	▽ 15	**REPTON 3** *Superior*	9.95
18	△ 19	**WINTER OLYMPICS** *Tynesoft*	7.95
19	●	**TRIPLE DECKER** *Alternative*	1.99
20	▽ 12	**BUGBYTE COMPILATION** *Bug-Byte*	7.95

Compiled by Gallup/Microscope

Mini Office II re-entered the chart last month at number 20 and has now shot up to number 10 as the only non-games package in the chart. Superior and Tynesoft dominate with Superior's Grandprix Construction Set remaining at number one for another month.

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Mono	£976.35
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Colour	£1236.25
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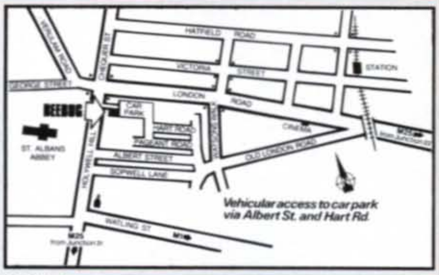

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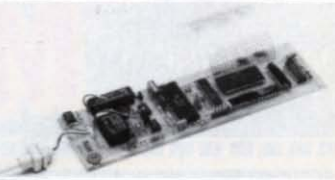
0782B Care 4 Way Cart.	14.95	14.20
0230C 65C102 6502 "Turbo"	119.00	113.05
0231D 80186 Co-Processor	228.85	217.41
0233F Universal 2nd Proc.	83.00	78.85

Master Modem



A new internal modem for the Master 128 that requires no soldering and may be fitted in a matter of minutes. The modem features V21/V23 baud rates which are ideal for Prestel, Micronet etc, auto-baud rate selection, tone and pulse dialing, auto-dial and auto-answer. An interesting feature is that it uses the internal Master speaker for call progress monitoring. The modem is supplied with the highly acclaimed Beebug Command ROM.

Stock Code 0759E Price £119.00
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1022C View 3.0 ROM	66.70	63.36
1013B View Driver Cassette	8.62	8.19
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1043B ViewSpell ROM	34.02	32.32
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0214B Watford DDFS Kit	56.35	53.53
0216B Watford DFS Manual	6.95	6.60
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Beebug C is a full implementation of the language C conforming to, and extending beyond the Kernighan and Ritchie standard. Beebug C produces fast compact code and supports floating point maths. A comprehensive set of library functions and macros are supplied on disc.

Features

- Runs on a standard 32K BBC model B, B+, Master 128 or Master Compact
- 40/80 Track DFS and ADFS compatible
- 6502 2nd processor compatible
- Support for Acorn operating system (vdu, osbyte, mode etc.)
- Powerful command line interpreter with over 20 commands & qualifiers
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- Full macro-handling facilities
- Debugging facilities and helpful error messages
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Tel: (0727) 40303

The language of the eighties

> *"Beebug C is about five times faster at compilation than the Acornsoft version and produces code at a fraction the length."*
> MICRO USER

Technical Summary

Beebug C is a full implementation of the Kernighan & Ritchie standard. The following is a summary of the full specification.

Expressions: *, &, -, !, ~, ++, –, sizeof, ->, *, /, %, +, -, >>, <<, <, >, <=, >=, &, ^, |, &&, ||, ?:

Assignments: =, +=, -=, *=, /=, %=, >>=, <<=, &=, ^=, |=

Declarations: char (8 bits), int (16 bits), short (8 bits), long (32 bits), float (32 bits), double (32 bits), unsigned, void, auto, static, extern, typedef, struct, union (inc. bit fields)

Statements: if, while, do, for, switch, case, default, break, continue, return, goto

Preprocessors: #define, #undef, #redef, #include, #if, #ifdef, #ifndef, #else, #endif, #line etc.

Library: over 90 library functions, plus 12 header files: h.stdio, h.stdlib, h.string, h.call h.ctype, h.assert, h.float, h.limits, h.stdarg h.stddef, h.math, h.setjmp

Beebug C

Stand Alone Generator

An add-on to Beebug C which produces stand-alone code which will run on any BBC or Master computer (memory permitting). Supplied on a dual-format disc which also contains a number of trig functions.

price £19 inc. VAT

stock code 0077B 5.25" disc
stock code 0078B 3.5" disc

Postage £1

The C Programming Language book
By Kernighan and Ritchie

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Price: £23.95 Postage £1

Stock code 1289B

Beebug C site licences available for educational establishments.

Please phone for details

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0736B Solderless ROM Board	36.80	34.96
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0750B Watford S/State 16K	32.20	30.59
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0752B Watford Diagnostic Disc	23.00	21.85
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0754B ROM/RAM Board 128K	102.35	97.23
0755B Write Protect Mk12	2.76	2.62
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0749B Aries B12C Adaptor	5.87	5.57
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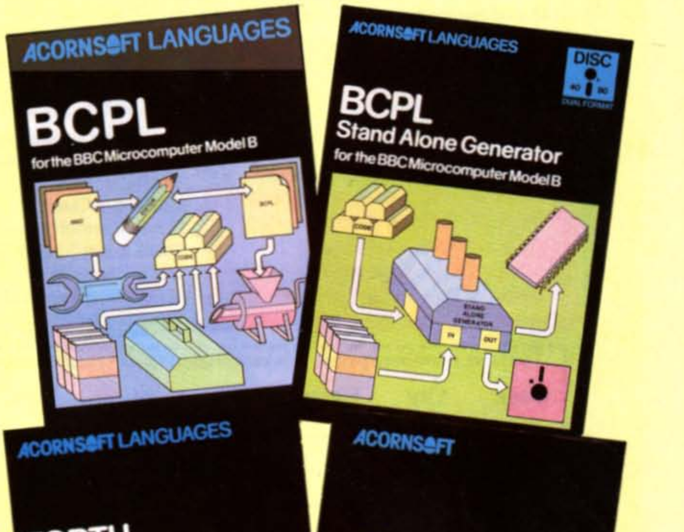
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BCPL
for the BBC Microcomputer Model B
ACORNSOFT LANGUAGES
DISC
BCPL
Stand Alone Generator
for the BBC Microcomputer Model B
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A full implementation in two language ROMs for the BBC Microcomputer Model B

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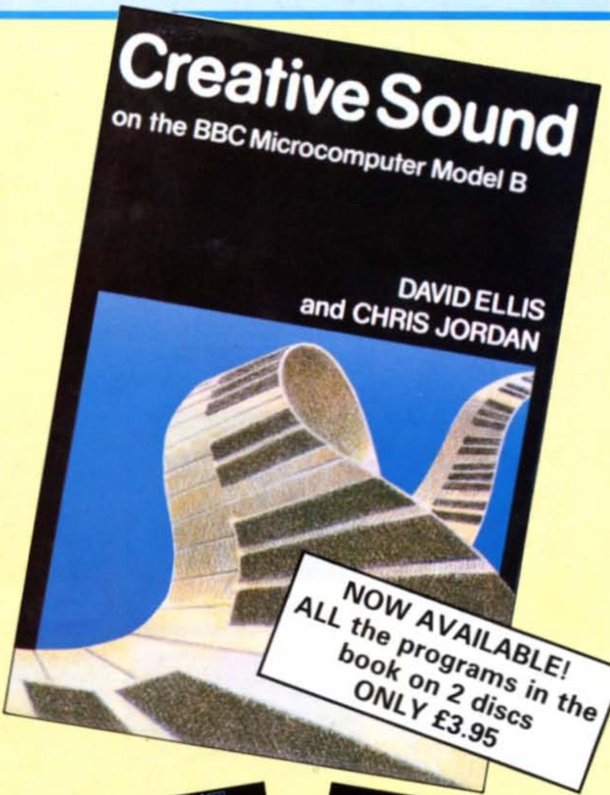
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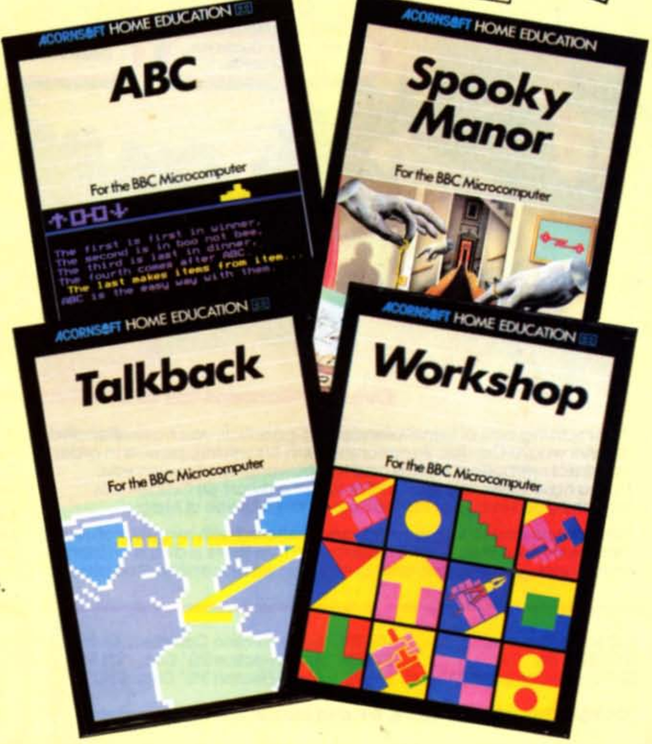
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ABC
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Spooky Manor
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Talkback
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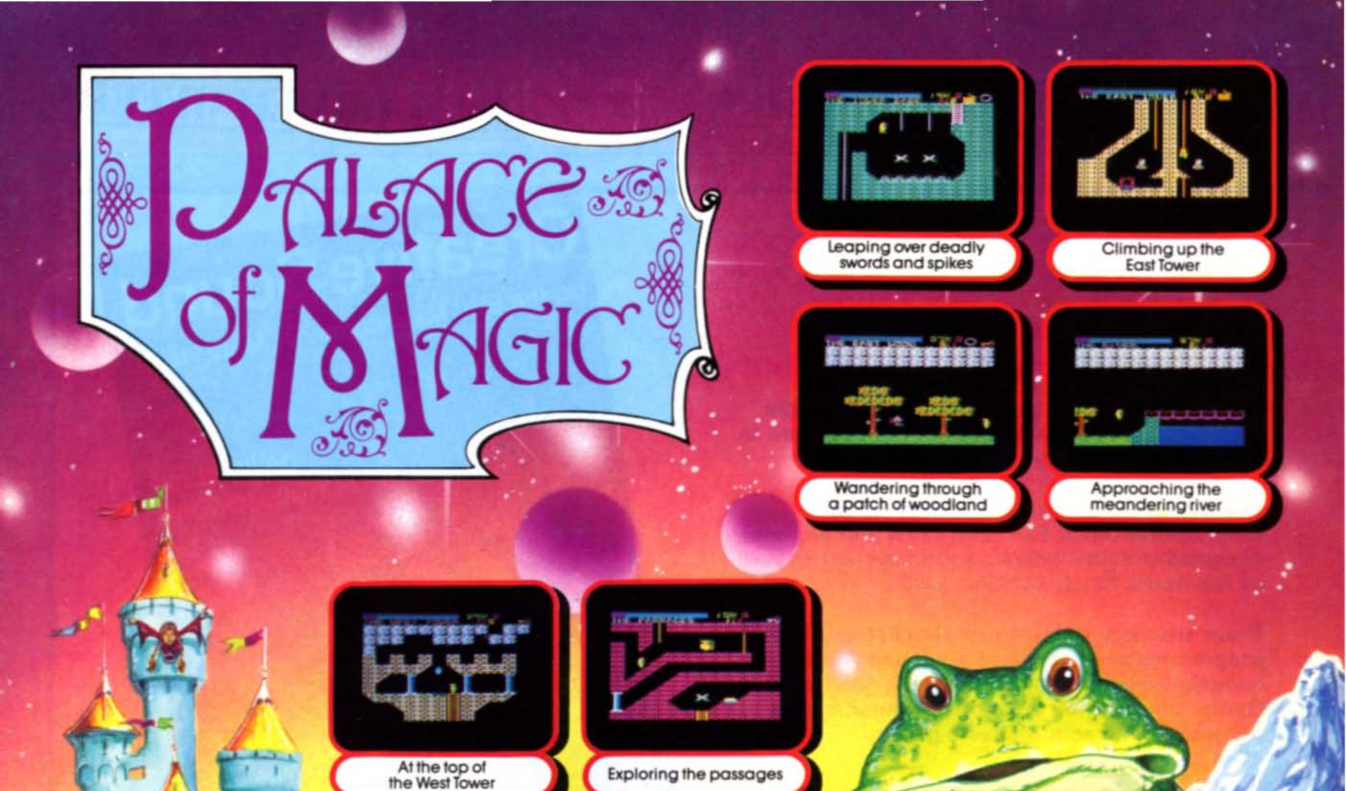
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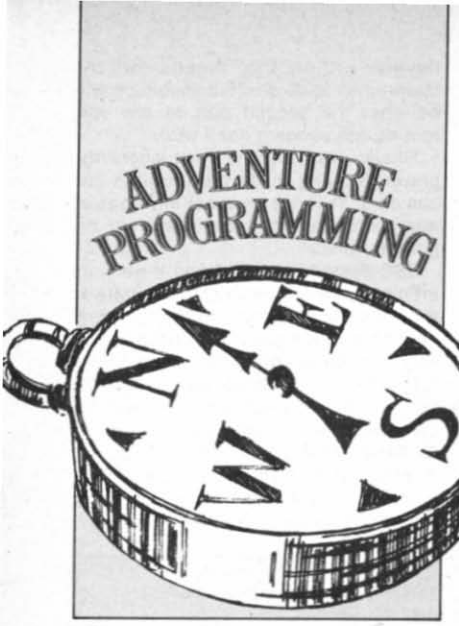

Opening with Close

Peter Gerrard continues his series on how to write adventures on the BBC Micro

NOW that we know how to work out what our verbs, link words, action words and nouns ought to be, and how to analyse them in any sentence that the player cares to type in by using our parser, it's about time that we took a look at incorporating some of those verbs in our finished adventure.

As ever, we'll be taking our 64 location western adventure as our example, and the two verbs that we're going to be looking at are Open and Close.

First of all though, a few words about some of the problems that we're going to encounter. And not only with these two verbs, as most of what I'll have to say is the result of a lot of experience in putting many different verbs into a whole host of adventures. The same sort of thing always seems to happen: The totally unexpected.

The first rule is more of a constraint than a rule: We'll never be able to cater for everything.

The second rule is much more refreshing: The level of Basic programming needed to cope with this vast variety of requests from the player is not that great. Quite often we'll be repeating the same sort of thing until we get totally fed up with it.

This can't be avoided, for the simple reason that although the code might look the same, the objects and situations being dealt with are not, and the response that a player might expect to come up on his screen after typing:

```
Open the door
```

is wildly different from that which he'd expect to see after typing:

```
Take the hammer
```

The code will follow the same sort of lines, namely can the object – door or hammer – be manipulated in the way suggested by the verb – open or take? If so, print up one set of responses and set a flag, but if not then print up something else.

Finally, our third rule is a very simple one: Expect the unexpected. Players of adventure games have the most bizarre ideas at times, and although we've already seen that we cannot hope to cope with everything, we ought to at least have a reasonable try.

The programming is simple because once the parser has done its work we are only having to deal with, at most, four different variables in terms of the words being manipulated. An object is derived from the noun, so that sorts itself out. If an action is being attempted then a separate flag might come into play – the player might be trying to carry too much, or open a door when he hasn't got the right key – but that's about the limit of it.

So, we're only dealing with a very few variables at any one time, and you'll soon find that a lot of verbs are only going to be used in two or three specific circumstances.

The player may type them in a lot, but as far as you, the programmer, are concerned, there are only those two or three things to sort out. Anything else can be dismissed with "You can't do that", or you can take the words that the player typed in and use them with a stock sentence "You can't"+*cm$*.

Thus if the player typed in as our initial input string *cm$* something like:

```
Put the basket in the tin
```

we would then tell him:

```
You can't put the basket in the tin
```

It makes the adventure a lot more readable from the player's point of view, and it looks as if a lot more thought has gone into the programming of it than is actually the case.

Finally, we said that you'll have to learn to expect the unexpected, an apparent contradiction. It's not that bad, actually, and you'll soon find after a couple of adventures that you really can anticipate the situations in which a player will try something totally bizarre – something that on your first program, you wouldn't have thought about or catered for. Such an example, on a small scale, occurs in the listings given this month for the two verbs.

You might credit a player with the intelligence to realise that if a small box is contained within a larger box, and the larger one is closed, then he cannot open the small one. The player might realise it too, but he'll try and do it all the same.

A similar situation applies if both are open, and he tries to close the small one second. It can't be done and, in real life you or I would realise this, but in the world of adventures the player will try and do everything you don't want him to do.

First of all we need to know some of the variables used: Object 1 is a large box and object 2 is a smaller box, objects 3, 4 and 5 are keys, but the noun *box* is noun 1 and noun *door* is noun 2.

If an object is in a location it has a location number associated with it. For example if we say ob%(3)=6, then object number 3 is location 6.

Location 0 is the non-existent place where things are kept when not active in the game (the smaller box starts off in the void), location -1 means held by the player, -2 means in the big box and -3 means in the small box.

First we have FN–open which simple

Turn to Page 24 ▶

◀ From Page 23

tests for the noun, box or door, and calls the appropriate routine or gives an error message.

In PROCopen_box the first test is to see if link word 1 (smaller) has been used: If so, then the player is trying to open the smaller box. Otherwise we check to see if the player is holding either the big box or the small box, generating an error message if neither is true (line 2150).

If he is holding the big box there is a quick check to see if it is already open: *o1* is set TRUE if it is open.

Now, the first time the player opens the box we want to tell him there is a smaller box inside, but any time after that we only want to say there is something inside. So we use a flag *bo* which will be initialised to zero, and then at line 2180 we put the smaller box inside the bigger box, tell the player it's there and increment the flag, *bo*.

Any time after that the player opens the big box PROClistbox is called with a parameter -2. What PROClistbox does is search through the locations of all the objects in the game and count the number of objects whose location matches the location specified by the parameter – in this case -2, meaning in the big box. A suitable message is given.

Opening the smaller box is much the same, except we need to check conditions – is it in the bigger box, and is the player holding that (line 2220)? And if it is in the bigger box is that box open (line 2230)?

The door opening is simpler. First we ensure that the player is in a room with a door (line 2330), then see if it's already open (line 2340). There are three doors which require keys and two which don't. Locations 5 and 48 need no key and just shoot off to PROCod1 which sets the door to open and tells the player.

The doors which require keys are slightly more complex and are dealt with in PROCod2. First we ensure that the player has the right key in his possession (line 2430). If he does and no link colour word was specified he can go ahead and open the door (PROCod1), otherwise we check that the link word matches the door and if so he can open the door. If not then we tell him the bad news and return (line 2450).

It might look daunting and horrible at first, but it isn't really, and a little bit of common sense goes a long way when trying to unravel it all.

So, having sorted out opening things we might as well have a look at closing them. This is a little bit easier to program, and since by now you should have a reasonable idea of how these things are put together I'm going let you work it out for yourself.

There are no checksums given here because the routines won't run on their own, so don't bother typing them in – you just need to work through them as if you were the micro.

From the careful treatment that we've given these two verbs I hope you'll be able to work out how to program other verbs into your own adventures. There are a number of things to watch out for when it comes down to the actual programming.

First of all you need to eliminate the impossible, and it's best to do this at the start of the routine, so that the smallest amount of time possible is spent checking on things. Having eliminated the impossible you then concern yourself with the possible, but not with having either the means or the opportunity to do so. This should usually be what the second part of any verb routine will concern itself with.

Finally, we have the case where the player is trying to do the possible and can do it. Then we must set any flags as appropriate and tell the player of his good fortune.

BBC Basic is very fast and if we write efficiently we can get very fast results as well. It's not necessary to learn a great deal of machine code in order to write a very competent adventure – I don't think it's necessary to learn any – and the factor that we keep coming back to, common sense, is your greatest ally.

● *Next time we'll be considering another vital part of any adventure game: The characters (apart from the player of course) who inhabit it.*

```
 2050 ====================
 2060    The Verb OPEN
 2070 ====================
 2080 DEF FN_open
 2090 IF no=1 PROCopen_box:=0
 2100 IF no=2 PROCopen_door:=0
 2110 PRINT"There's nothing to open here
."
 2120 =0
 2130 DEF PROCopen_box
 2140 IF li=1 PROCop_small:ENDPROC
 2150 IF ob%(1)=-1 ELSEIF ob%(2)=-1 PROC
op_small:ENDPROC ELSEPRINT"You don't hav
e a box.":ENDPROC
 2160 IF o1 PRINT"It's already open." EL
SEPRINT"You open the box..."
 2170 o1=TRUE
 2180 IF bo=0 ob%(2)=-2:PRINT"And find a
 smaller box.":bo=bo+1:ENDPROC
 2190 PROClistbox(-2):ENDPROC
 2200 DEF PROCop_small
 2210 IFbo=0 PRINT"What smaller box?":EN
DPROC
 2220 IF ob%(2)=-1 OR (ob%(1)=-1 AND ob%
(2)=-2) ELSEPRINT"You haven't got the sm
aller box":ENDPROC
 2230 IF (ob%(2)=-2 AND NOTo1) PRINT"You
 can't _ the bigger box is closed.":ENDP
ROC
 2240 IF o2 PRINT"It's already open." EL
SEPRINT"You open the smaller box..."
 2250 o2=TRUE:PROClistbox(-3):ENDPROC
 2260 DEF PROClistbox(L%):of=0
 2270 FOR I%=1 TO nn:IF ob%(I%)=L% of=of
+1
 2280 NEXT:IF of=0 PRINT"There's nothing
 inside":ENDPROC
 2290 PRINT"There seems to be something
inside ";
 2300 IF of>1 PRINT"(in fact several som
ethings)";
 2310 PRINT:ENDPROC
 2320 DEF PROCopen_door
 2330 IF cp<>5 IF cp<>48 IF cp<>52 IF cp
<>53 IF cp<>54 PRINT"There's no door her
e.":ENDPROC
 2340 IF (cp=5 AND d1)OR(cp=48 AND d2)OR
(cp=52 AND d3)OR(cp=53 AND d4)OR(cp=54 A
ND d5) PRINT"The door is already open.":
ENDPROC
 2350 IF cp=5 OR cp=48 PROCod1 ELSE PROC
od2
 2360 ENDPROC
 2370 DEF PROCod1:IF cp=5 d1=TRUE
 2380 IF cp=48 d2=TRUE ELSEIF cp=52 d3=T
RUE
 2390 IF cp=53 d4=TRUE ELSEIF cp=54 d5=T
RUE
 2400 PRINT"You ";:IF cp>48 PRINT"unlock
 and ";
 2410 PRINT"open the door.":ENDPROC
 2420 DEF PROCod2
 2430 IF (cp=52 AND ob%(3)<>-1)OR(cp=53
AND ob%(4)<>-1)OR(cp=54 AND ob%(5)<>-1)
PRINT"You don't have the right key.":END
PROC
 2440 IF li=0 PROCod1 ELSEIF (cp=52 AND
li=3)OR(cp=53 AND li=4)OR(cp=54 AND li=5
) PROCod1:ENDPROC
 2450 PRINT"That's the wrong door.":ENDP
ROC
 2460 ====================
 2470    The Verb CLOSE
 2480 ====================
 2490 DEF FN_close
 2500 IF no=1 PROCclose_box:=0
 2510 IF no=2 PROCclose_door:=0
 2520 PRINT"There's nothing to close her
e."
 2530 =0
 2540 DEF PROCclose_box
 2550 IF li=1 PROCcl_small:ENDPROC
 2560 IF ob%(1)=-1 ELSEIF ob%(2)=-1 PROC
cl_small:ENDPROC ELSEPRINT"You don't hav
e a box.":ENDPROC
 2570 IF NOTo1 PRINT"It's already closed
.":ENDPROC
 2580 PRINT"You close the box.":o1=FALSE
:ENDPROC
 2590 DEF PROCcl_small
 2600 IFbo=0 PRINT"What smaller box?":EN
DPROC
 2610 IF ob%(2)=-1 OR (ob%(1)=-1 AND ob%
(2)=-2) ELSEPRINT"You haven't got the sm
aller box":ENDPROC
 2620 IF NOTo1 PRINT"You can't _ the lar
ger box is already closed.":ENDPROC
 2630 IF NOTo2 PRINT"It's already closed
." ELSEPRINT"You close the smaller box:"
 2640 o2=FALSE:ENDPROC
 2650 DEF PROCclose_door
 2660 IF cp<>5 IF cp<>48 IF cp<>52 IF cp
<>53 IF cp<>54 PRINT"There's no door her
e.":ENDPROC
 2670 IF li=0 ELSEIF (cp=52 AND li=3)OR(
cp=53 AND li=4)OR(cp=54 AND li=5) ELSEPR
INT"That's the wrong door.":ENDPROC
 2680 IF (cp=5 AND NOTd1)OR(cp=48 AND NO
Td2)OR(cp=52 AND NOTd3)OR(cp=53 AND NOTd
4)OR(cp=54 AND NOTd5) PRINT"The door is
already closed.":ENDPROC
 2690 IF cp=5 d1=FALSE
 2700 IF cp=48 d2=FALSE ELSEIF cp=52 d3=
FALSE
 2710 IF cp=53 d4=FALSE ELSEIF cp=54 d5=
FALSE
 2720 PRINT"You close the door";
 2730 IF cp>48 PRINT" and hear a lock cl
ick";
 2740 PRINT".":ENDPROC
```

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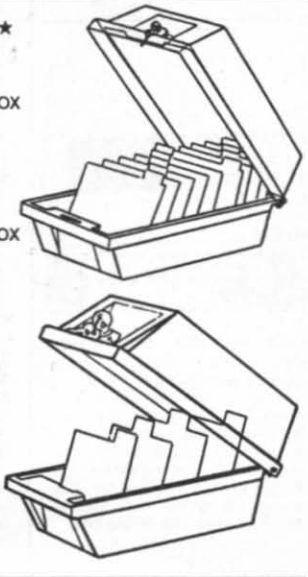

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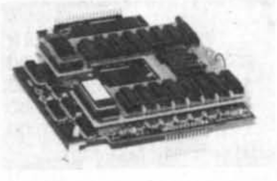

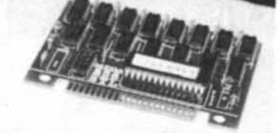

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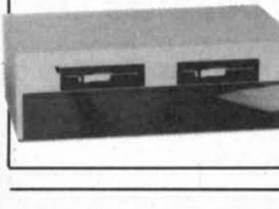

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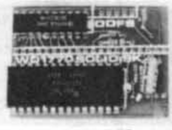
WD-1770 DDFS with ADFS 2.1 ROM set	**£55.00 inc.**

Data sheet available on request.

2) WD-1770+8271 (DFDC) DISC INTERFACE: for BEEB already equipped with the 8271. This system allows you to keep the existing 8271 disc interface while adding the new WD-1770 chip. It has a simple switch to allow changing between the 8271 and the WD-1770. To operate the hardware, you will need either the latest ROMs from Acorn (8271 DNFS 1.2, 1770 DNFS and 1770 ADFS) or Soidisk ROMs. If you are stuck with old or inappropriate DFS software, buy the inexpensive DFS 2.2 ROM. Prices are:

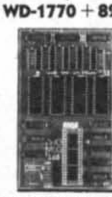
DFDC without DFS ROM	**£45.00 inc.**
DFDC with DFS 2.2 ROM	**£50.00 inc.**
DFDC with ADFS 2.1 ROM set	**£55.00 inc.**
DFDC with 2.2 and 2.1 set (3 ROMs)	**£63.00 inc.**

Data sheet available on request.



WD-1770 DFS

WD-1770 + 8271



TWO MEG 128

TWOMEG 128K: Number One Best Seller!

The new style TWOMEG 128K add-on board for the BBC is the closest emulation of the Master 128K ever achieved. It combines Sideways RAM, Shadow RAM and four extra Eprom sockets (4 on the BBC motherboard) in a single product. It is unobtrusive and easy to fit, just drop in and go!

It's the ideal upgrade for all Beebs, with more ROM sockets and even bigger memory than the Master! Compatible with Computer Concepts InterWord, Sheet and Spellmaster, Acorn View 3.1, ViewSheet, ViewStore and Basic, it is supplied with a quantity of useful software on five discs, eg database, spelling checker, macro basic, Ramdisk for STL DFS and ADFS etc.

A clever switch write-protects only the 8 banks of Sideways RAM, without affecting the Shadow RAM. *Price: ex VAT:* **£52.17, inc VAT £60.00**

FOURMEG 256K:

256K RAM (shadow and/or Sideways) 4 extra H/C ROM sockets on board (4 on BBC motherboard), 4MHz switchable CMOS 65CO2 cpu, 32K Manager ROM. *Price* **£110.00 inc VAT.**

TWOMEG 256K:

256K RAM (shadow and/or Sideways) 4 extra H/C ROM sockets on board (4 on BBC motherboard), 2MHz CMOS 65CO2 cpu, 32K Manager ROM.

Special Offer on InterWord and Wordwise Plus when purchased with any TWOMEG or FOURMEG board:

Wordwise Plus:	**£30.00 inc VAT**
InterWord:	**£50.00 inc VAT**

REAL TIME CLOCK:

gives your Beeb time, date and configure facilities similar to the Master. *Price* **£29.00 inc VAT.**

SWR32: 32K Sideways RAM, base unit and disc. *Price* **£20.00 inc VAT.** SWR 64: 64K Sideways RAM, 2 H/C ROM sockets on board, base unit and disc. *Price* **£30.00 inc VAT.**

EPROM PROGRAMMER:

The UVIPROM is the cheapest Eprom programmer on the market, yet the easiest to use. UVIPROM for programming 2764 and 27128 (21V): **£20** UVIPROM-32 for programming 27256 (12.5V): **£20 inc VAT.** MULTIPROM, the deluxe version, programs most types of Eproms and fitted with TEXTOOL ZIP socket, *Price* **£44.50 inc VAT.** The UVIPAC (Eprom Eraser) can erase any 3 Eproms in approximately 15 minutes, *Price* **£20.00 inc VAT.**

MASTERPLAN:

If you are thinking of exchanging your BEEB for a MASTER or an ARCHIMEDES, Solidisk MASTERPLAN is for you. We can quote immediately over the phone the buy-back value of your BEEB and the balance on your new system. So please give us a try!

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVENUE, SOUTHEND

ARCHIMEDES:

	Without monitor		Acorn monochrome		Acorn colour	
	ex VAT	inc VAT	ex VAT	inc VAT	ex VAT	inc VAT
A305	699.00	801.60	749.00	859.10	899.00	1031.60
A305 upgraded to one megabyte, same as A310:						
A305+	731.00	840.65	781.00	898.15	913.50	1039.03
A310	775.00	891.25	825.00	948.75	975.00	1121.25
A305 upgraded to 1 megabyte with MS-DOS emulator, same as A310M:						
A305M+	791.00	909.65	841.00	967.15	973.50	1119.52
A310M	835.00	960.25	885.00	1017.75	1035.00	1190.25
A305M+ with second 40/80 track manual switch 5 drive: A305M+FD	886.00	1018.90	935.00	1075.25	1068.50	1228.77

The MS DOS emulator requires at least 1MB of RAM to run and most PC software is only available on 5¼ discs. Current DOS version is 3.2 supplied on 720K format but capable of read/write 360K IBM PC format on the A305M+FD systems.

COMPACT 128K:

	Without monitor		Acorn monochrome		Acorn colour	
	ex VAT	inc VAT	ex VAT	inc VAT	ex VAT	inc VAT
Compact 128K:	347.80	399.97	391.30	449.99	521.00	599.15
Compact 128K, CDFS ROM and a second disc drive, A, B or C:	434.00	499.10	478.00	549.70	608.70	699.99

A = twin 3.5" drives, B = 5.25" drives, C = one 3.5" and one 5.25".

Twin drives are usually required for disc copying, the Solidisk CDFS complements the Acorn ADFS with a superset of DFS commands and utilities such as single and double density, copying DFS discs to ADFS discs etc.

MASTER 128K:

	Without monitor		Philips monochrome		Philips colour	
	ex VAT	inc VAT	ex VAT	inc VAT	ex VAT	inc VAT
Master 128K:	391.00	449.65	455.00	525.25	574.00	660.00
Master 128K with Twin disc drives:	556.50	639.97	635.00	730.25	730.43	839.99

The MASTER 128K comes bundled with Wordprocessor (View), spreadsheet (ViewSheet), Terminal software, DFS and ADFS. The monochrome monitor is 12", can be with green (BM7022) or amber (BM 7522) phosphor, the colour monitor is 14" CM8833 with all imaginable inputs! (The Acorn colour monitor is a badged version of the latter.)

PLEASE NOTE: generous TRADE-IN allowances are available for upgrading your present system. Please call for immediate quotation.

THE IDEAL XMAS PRESENT:
THE NEW UNIVERSAL TELETEXT ADAPTER
from Solidisk
£99.99 including VAT and TTX software on disc

At present, the BBC Telesoftware service is putting out around 400K of software each week on BBC2 which can be all yours, automatically, **FREE**. There are many Teletext Adapters on the market but none is built like our Universal Teletext Adapter nor has as many features.

v Ours does not take power from your computer.
v Ours does not have trimmers to select TV stations.
v Ours does have TV and sound output.
v Ours does have a data port to connect to a wide range of computers.

Check your monitor. If it has an input for composite video and sound, it can be turned into a high quality TV set for £1.15! (the price of a lead) or two functions for the price of one. You can be watching TV while your computer is downloading software or use it to play your video tapes on your monitor. Our TTX software is extremely user friendly, and complementary to the BBC ATS ROM (with which it is compatible). It is auto-tuning and menu driven. It has simple commands to execute most frequent and repetitive tasks. For example, typing in a simple P* will download all new programs, an SQK* will scan and keep all displayable teletext pages. Our TTX software can be driven by EXEC files, in other words, it can work intelligently and completely unattended.

Solidisk TTX Version 1.10 supports Acorn and Solidisk Sideways RAM and Shadow RAM to increase RAM buffer of teletext pages (64 on the Master, 128 with Solidisk 128K sideways RAM, 255 with Solidisk 256K sideways RAM).

The beauty of the system is that you only need a new TTX disc and a new data lead to use the same Teletext Adapter on another computer. The same TTX software is also implemented on the BBC, Compact, Master, Archimedes, Atari ST, IBM and Amstrad PC's and soon on the Amiga A500. Furthermore, any computer can download software that is not meant for itself, so that you may download PC software for friends.

Coming soon . . .
THE UNIVERSAL COLOUR DIGITISER
for Video Applicaitons
from Solidisk

For under £200 + VAT. Available for BBC, Master, Compact, Archimedes, Atari ST, IBM and Amstrad PCs and Commodore Amiga.
Maximum resolution: 640 dots (horizontal), by 320 lines (vertical), 4096 colours, 50 frames per second.

v Displays, freezes and digitises TV pictures.
v Displays, computer generated pictures to maximum resolution.
v Adds computer display to TV signal.
v Full TV screen.
v Programmable in BASIC, Pascal or C.
v Inputs: Composite video, RGB analog, RGB TTL.
v Outputs: RGB analog, composite video and UHF channel.
v Low cost.
v Available December 87.

The new Colour Digitiser splits the incoming composite video signal (from TV set, VCR or our Teletext Adapter) into 12-bit colour information (4-bit red, 4-bit green and 4-bit blue) which is stored in parallel and in real time in a video frame buffer. The latter is accessible to both the display circuitry and the controlling computer.

Because both digitised TV picture and computer generated (or transformed) picture can be stored on the same frame buffer, the digitiser is very flexible in use.

The usual computer display RGB analog (or TTL) can be inserted into the TV signal at any time.

The output can be any combination of one or two of the video sources: TV, RGB (insertion) or video frame.

The output is RGB analog with composite and separate sync. An optional plug-in adapter (£25) converts RGB analog to composite video and UHF TV.

The video frame buffer covers the entire TV screen (no visible border). The video RAM address is auto-incrementing with separate line counter: thus fast and partial refresh by DMA is possible, with up to a maximum speed of 10 MPS (millions pixels per second).

For information: please ring Solidisk sales office.
*patent pending product. Specifications correct at time of going to press but may change without notice.

ORDERING BY POST:

All items can be ordered by post, sending the coupon below and enclosing cheques, POs, drafts or credit card numbers or by phone. P and P is charged as follows:
Less than 1 KG (eg software, cartridges and books): **£2.00**
Up to 3 KGs (eg single disc drives): **£3.00**
Up to 10 KGs (eg computer, monitors, printers, twin disc drives): you can specify either parcel post £6.00 or courrier/Datapost: **£12.00.**
Above 10 KGs (eg complete system), please either allow generously or give us a ring for quotation.

12MHz PC-AT (80286) COMPATIBLE:

12MHz-AT motherboard with one serial and one parallel interface (pictured)	£255
36 × 256K RAM chips (1 Megabyte)	£100*
alternatively, 36 × 1MB RAM chips (4 Megabytes)	£420*
360K/1.2MB Floppy disc controller card	£32*
1.2MB (360K switchable) disc drive	£95*
Hercules compatible mono video card	£35*
Paradise compatible EGA video card	£100*
180W power supply unit	£45*
101-key, ATE (Archimedes) style keyboard	£45*
Lift top metal case with key lock	£45*
30MB winchester and controller	£350*
Assembly charge (if required)	£20*
24-hour burn-in test (if required)	£10*

10MHz PC-XT (8088-1) COMPATIBLE:

10MHz XT motherboard	£78
18 × 256K RAM chips (512K)	£50*
18 × 64K RAM chips (to 640K)	£20*
Floppy disc controller card	£16*
720K (360K switchable) disc drive	£90*
Hercules compatible mono and printer card	£35*
Paradise compatible EGA video card	£100*
180W power supply unit	£45*
108-key, ATE (Archimedes) style keyboard	£45*
Lift top metal case with key lock	£45*
30MB winchester and controller	£350*
Assembly charge (if required)	£20*
24-hour burn-in test (if required)	£10*

*ex VAT prices, applicable when purchased with XT or AT motherboard. Please add 20% otherwise. Prices may fluctuate with exchange rates.

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17 Sweyne Avenue
Southend-on-Sea,
Essex SS2 6JQ

Name: ....
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P&P: £2/£3/£6/£12
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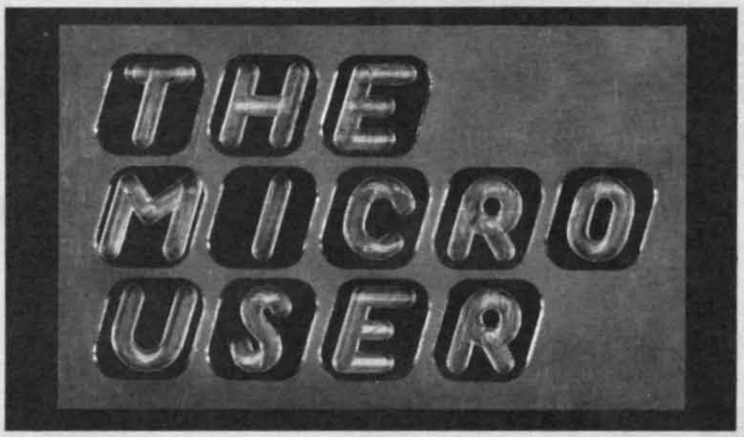
THE MICRO USER
INNOVATION AWARD

As the search for the most innovative use of a BBC Micro nears completion, here is a final sample of the stories behind the competitors, each vying for a chance to win a £1,000 Archimedes.



Micro milling

A FLOORING specialist from Brighton has turned his BBC Micro into a new "brain" for an old giant milling machine.

Richard Shaw was introduced to the Japanese three-axis vertical milling machine by a friend who had bought it cheaply at an engineering auction.

He discovered that the operating system was "stone age" and was proving frustratingly unreliable.

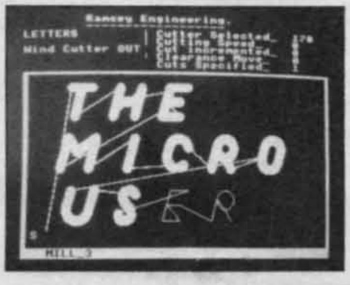
"It was powered by three stepper motors and was controlled by a separate free-standing console. The method of programming this machine was to enter data by typing it on to punched tape via a special typewriter", he said. "This tape was then fed into the console".

Mr Shaw offered to help and organised an interface to cut out the console before beginning to write the software.

The system as it now stands uses a BBC B, disc drive and monitor. Data is typed on to the keyboard and can then be saved to disc.

Cutting speeds, cutting increments and a number of other perameters can all be adjusted with a screen editor.

"The milling machine can be programmed to work complex shapes for hours on end and the user has an animated display of the cutter tracking around the work", Mr Shaw explained.



Tracking the birds

NEARLY a million birds are "ringed" in Britain each year – providing conservationists with vital information about their migrations and life spans.

When these birds are recaptured – and many are – information including species, ring number and usually some measurement is recorded.

Ringers may handle hundreds of birds annually, generating lots of routine paperwork as they tabulate yearly totals by species, age and habitat, and listing basic ringing data for the British Trust for Ornithology.

Thanks to a BTO project involving the BBC Micro this mass of information has been reduced to manageable proportions.

A group of ringers, all amateurs, have produced a coding system for ringing data and written it for the BBC Micro.

The result is a package flexible enough for all ringers' needs whatever their type of ringing. Data is stored as Ascii text allowing comunication between systems and interaction between the programs and various databases, wordprocessors and spreadsheets.

The programs perform data entry and editing, file sorting, data abstraction and tabulation – even statistical analysis and data submission to BTO on computer media.

Powerful puppets

HELPING handicapped children develop communications skills is all in a day's work for a BBC Micro in Bristol.

Drama therapist Brian Johnson uses a system in which visual images like shadow puppets can be moved by a variety of sound.

"This form of presentation helps the extremely introverted child with communication problems to experiment with making sounds and movement with reduced self consciousness.

"It has proved especially effective with autistic and physically handicapped children", said Brian Johnson.

The winner of this prestigious award is being announced at the Electron & BBC Micro User Show, opening at the New Horticultural Hall, Westminster, on November 13.

Facts in a flash

INSTANT information for an increasing number of enquirers wanting to know about courses at a West Country college is being provided by a BBC Micro.

Lecturer Dawn Walker describes Somerset College of Arts and Technology in Taunton as a busy centre in a rapidly growing county town.

She explains that the need for computer help grew as the number of people calling and telephoning about courses steadily increased.

"In order to improve our response to these potential students, we are setting up a viewdata service, using a BBC Micro and Econet", she said.

The first terminal is operated by a touchpad on the window of the information centre in the college's entrance hall.

It has already proved popular and demand for space on it has grown from inside the college.

"So far we are concentrating on providing an electronic brochure of the courses on offer, plus the beginning of what is clearly going to be a large section under the heading of 'general information' to include such things as examination dates, how to apply for grants and where the Students' Union is.

"We have ambitious hopes for future development. We would like to to involve students themselves in the editorial side since so many of them are likely to come into contact with viewdata systems in the business world.

"We are also considering sponsorship and advertising. Eventually, we hope to go on line, so that the whole country – if not the world – can find out all they need to know about us via their own micros", said Mrs Walker.

At the heart of things

BETTER awareness of life-threatening diseases of the heart is being achieved by a BBC Micro, which is being used as part of an electrical stimulator for use in heart trouble diagnosis.

Dr Tom Cochrane, lecturer in cardiovascular science in the Department of Medical Physics at the Royal Hallamshire Hospital, Sheffield, explained where the computer fitted into the research.

Specialists in the field investigating life-threatening problems need to study the heart under controlled conditions. The tests have traditionally been done using banks of electrical hardware.

"As our understanding of the heart increases, so too does the sophistication required for further studies. The quantum leap in electrical stimulation devices for cardiac work will come with the use of micros," Dr Cochrane predicts.

The colour graphics and function key facilities of the BBC Micro are used to provide a powerful interface between user and stimulator. The user port and built-in assembly language allow timing to millisecond accuracy and realtime control of stimulator output, which in turn controls the activity of the heart.

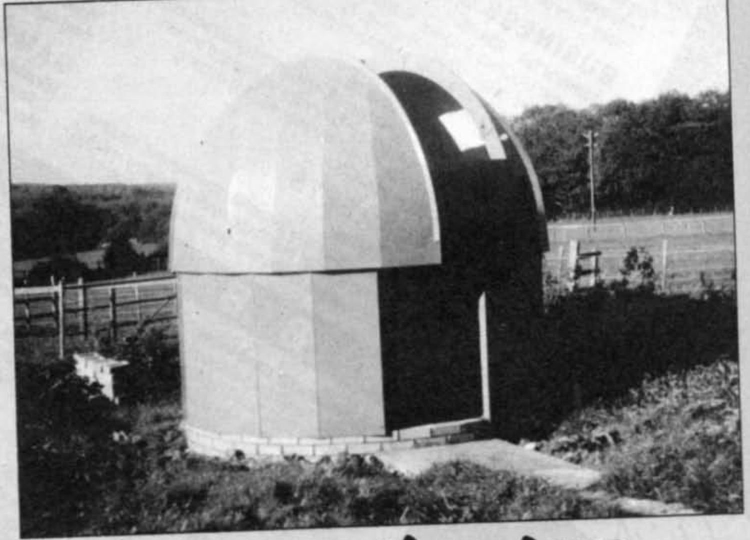
Two sensing and two pacing wires are interfaced on four user port lines using a relatively simple sensing-simulating unit.

This is electrically isolated to reduce risk to the patient.

Large numbers of test stimulation sequences – many of which are not feasible by any other means – can be created, executed and stored.

Clinical trials are being carried out on the package at St George's Hospital and Medical School, London.

Dr Cochrane comments: "Devices similar to this may soon be in use in centres all over the world, helping to understand and control one of the human body's most vital organs".



Ways to the stars

MIDDLESEX engineer Frank Tobin is using his BBC Micro to help amateur astronomers build small but effective, low-cost dome observatories.

Mr Tobin explains that domes of conventional design are very difficult to build. Most amateurs either do without or build one of the less desireable square shed types.

"To overcome this difficulty, I have devised a completely new way of building a dome which looks no different externally from the conventional type".

He explains that the main problem surrounds the fact that individuals need their own combination of features – the radius, the length, width and position of the slit, and the number and size of the panels.

"To avoid having to re-design every time there is a change, I have used my own CAD program on the BBC Micro to compute the figures and shape of all parts of the dome so that a bespoke design can be obtained.

"This allows the builder to specify the particulars of his dome and save considerably on cost by keeping the size down to a minimum.

"The required design can now be supplied in a matter of minutes".

Build your own system...

with the Minerva SYSTEMS DELTA, GAMMA and SIGMA

Individual programs designed to integrate; use separately or link together to form a powerful business system. Systems Delta, Gamma and Sigma . . . designed by highly acclaimed professional programmers with proven ability on the BBC, now providing definitive software for the Archimedes.

ARCHIMEDES

DATABASES

DeltaBase £29.95
Extremely powerful yet simple to use general Database. Over 8000 records, 255 fields and 16 subsets. Pull down Help Screens. Various screen modes. Extensive single or multiple criteria searches, sorts and maths facilities. Restructuring records is easy. Imports data from Viewstore, Betabase, InterBase, Mini-Office, etc.

System DeltaPlus £69.95
Extensive Relational Database Management System. 2 billion records. 16 million fields. 24 million subsets. Infinite files open at once. Powerful WIMP database. Multiple user-definable print formats. Unrivalled, comprehensive maths, searches and sort. Multi-tasking. Mailing labels, etc. Extensive Reporter. Card copier. Fully programmable. Imports dBase files.

BUSINESS GRAPHICS

GammaPlot £34.95
Versatile Graphics program. Multiple charts on screen at any time including pie, scatter, line, hist, 3D. On-Screen editor for text presentation. Macros. Entry by keyboard or any Delta/Gamma File.

System GammaPlus £69.95
Graphics Management System. Multiple charts on screen at any time. Over 10 types available. Definable scaling and screen formats. Screen editor. Statistical analysis. 3-D charting. Macros. Fully programmable.

SPREADSHEETS

Sigma Sheet £49.95
Fast and extensive, yet simple to operate spreadsheet. Massive sheet size 2000 rows by 16000 columns. Full maths facilities with automatic relative or absolute reference adjustment.

System Sigma £79.95
Powerful Spreadsheet Management System containing the facility to design your own tailored system. Infinite number of sheets in memory at once. Facility to add functions, eg. draw a bar chart in the top corner of the sheet. Fully programmable. Imports Lotus/Symphony files.

ACCOUNTS

System Delta Personal Accountant £69.95 each module
The only flexible accounting suite. Use modules separately or integrate. Contains many features not found on other micros including definable invoice layouts, varied discount structures on one invoice, archive mail order customers for future mailshots, add new credit account at time of invoicing, selection of aged debtors/creditors or statements by various criteria, generates purchase orders, suggests stock levels, determines most profitable stock items, stock and sales graphs, numerous user-definable nominal accounts with unlimited bank accounts. **Order Processing/Invoicing, Sales Ledger, Stock Management, Purchase Ledger, Nominal Ledger.**

Specialist Applications
Flexible specialist software available for School Administrator, Video Rental, Newsagent, Hotelier, Genealogy. (Timetabling coming early 1988)

GAMES

Minotaur Game £14.95
3 dimensional maze game. Use brains or force to kill the Minotaur.

BBC MICRO

System Delta with Card Index £64.95
Still the most comprehensive and flexible data management system on the BBC. 8160 records, 255 fields, 8000 characters per record. 8 subjects. Up to 5 files open at any time. Find any record in 3 seconds. Extensive single or multiple criteria searches, sorts and maths facilities. Multiple print formats. Default card. Card copier for transfer between files. Fully programmable relational system with over 150 commands available.

Mailshot, Reporter and Inter/View Link £19.95 each
Three versatile support programs for use with all System Delta files. Mailshot produces up to 4 across labels and links with wordprocessors for mail-merged documents. Reporter produces simple lists as well as fully definable reports including negative or positive columns, averages, totals, headings, sub and sub-sub-totals. Inter/View Link transfers data directly or as a result of any calculation including sum, average, count, etc.

System Delta Personal Accountant £45.95 each module (Nominal £55.95)
Five comprehensive accounting modules for use separately or as integrated suite. Many advanced features as listed above. Total flexibility allows customisation if required. **Order Processing/Invoicing, Sales Ledger, Stock Management, Purchase Ledger, Nominal Ledger**

Specialist Applications from £54.95
Comprehensive management programs for Hotelier, Video Rental and Newsagent.

System Gamma £49.95
The first Graphics Management System. Anyone can produce stunning graphics and charts easily from the menu driven GammaPlot supplied. Multiple charts on screen at any one time and in any position desired. On screen text editorial. Several fonts provided for variable text. Statistical analysis. Macro facility. Entry by keyboard or System Delta files. Fully programmable to create your own graphics programs.

School Administrator £69.95
Pupil and staff records allow extra fields to be added if desired. Entry reports for examination boards. Form 7 DES statistics, etc.

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Link your BBC Micro to the outside world with...

MicroLink

Electronic mail – The cheapest and fastest form of communication possible. It costs the same to send a message to one mailbox as to 500!

Telex – Link up with 96,000 telex subscribers in the UK and 1.5 million worldwide. You can even send and receive telexes after office hours or while travelling.

Telemessages – Type in your message before 8pm and delivery is guaranteed by first post the next day (except Sunday), anywhere in the UK and USA.

Tele-booking – Reserve train and theatre tickets, check flight details worldwide, or order from a vast range of products – from flowers to floppy discs.

Telesoftware – Download directly into your BBC Micro any program from the ever-growing library now available on MicroLink – games, educational and utilities.

Company searches – Obtain facts about any British limited company in seconds, and fully analysed financial information on over 100,000 major companies.

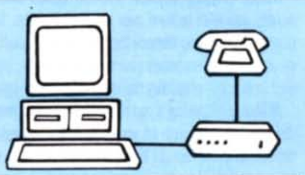
Translation – Access the biggest and most up-to-date multi-lingual dictionary in the world, with over 380,000 words.

News – Use the powerful search commands to pinpoint vital business information from the world's leading news services, newspapers and periodicals.

Radiopaging – If you also have a pocket radiopager you'll be alerted each time an urgent message arrives in your mailbox. So you're always in touch.

Gateways – Get through to New York in just five seconds – or key into the EEC computer in Luxembourg, which links you to 600 databases throughout Europe.

When you join MicroLink you've got the world of communications at your fingertips – 24 hours a day. You'll have immediate access to ALL the facilities offered by Telecom Gold ... and a great deal more besides.

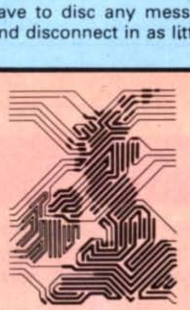


	Typical comms packages
A	*Watford: Apollo V21, V23 auto-dial, auto-answer modem + Comms rom (£82.25)*
B	*Dataphone: Demon V21, V23 auto-dial, auto-answer modem + Z-ROM + Disc-Connect software (£96.49)*
C	*Pace: Nightingale V21, V23 manual dial modem + Commstar II rom (£98.90)*
D	*Beebug: V21, V23 auto-dial, auto-answer modem + Comms rom (£103.99)*
E	*Miracle: WS4000 V21, V23 auto-dial, auto-answer modem + Dialup (£285.39)*

All you need – apart from your BBC Micro – is a modem, which plugs into your telephone wall socket, plus suitable communications software.

We have provided a list of possible combinations below, ranging from the very cheapest to ones which can automatically dial the MicroLink telephone number and connect you to the service – all you have to do is type in your personal security password.

Whichever equipment you use, you will be able to call MicroLink, open your mailbox, save to disc any messages waiting for you, and disconnect in as little as two minutes.



More than 90 per cent of subscribers can connect to the MicroLink computer at local call rates.

TO FIND OUT MORE
Fill in the coupon and send it to the address below. You will receive full details of services and costs, together with an application form. Complete this and within days you and your BBC Micro will be able to use all the services of MicroLink and Telecom Gold.

Please send me full details about MicroLink, and information sheets about the following hardware and software options (please circle):

A B C D E

Name____________________

Address____________________

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Postcode____________________

Send to: MicroLink, Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

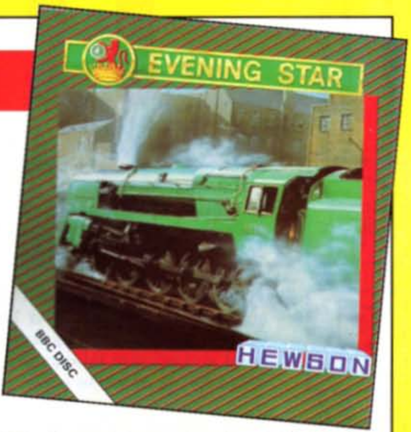
MU12

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

SOFTWARE

Evening Star

S	G	P	V	O
7	8	10	9	9



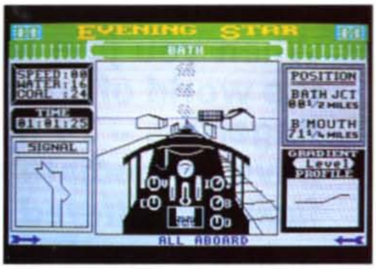
SOUNDING very much like a local newspaper, Evening Star is the name of the locomotive in a new railway simulation program from Hewson.

In your joint roles of fireman and driver you must traverse 70 miles of undulating countryside from Bath to Bournemouth – safely, economically and, above all, on time!

For a railway enthusiast this is a daunting task – for an absolute novice it's damn near impossible. Thankfully those frightfully nice people at Hewson have built in a multitude of options which allow you to assume varying degrees of control over the Evening Star.

The instructions consist of two leaflets: The first is entitled "How a steam locomotive works" and covers each of the engine's controls, its function, and any associated safety factors. Leaflet number two details the keyboard controls and the eight game options available.

The simulation uses a comprehensive yet easily read display. The Evening Star moves against a line drawing background – stations, tunnels, and bridges are all drawn in perspective as you approach. To the right of this is a profile of the next mile and a half of the route – this enables you to take a run at the hills or prepare to brake on the descents.



The left half of the screen shows the status of the next signal, your current speed, and the state of your coal and water reserves.

Before starting any run you are asked what degree of control you wish to have over the proceedings. Selecting the easiest option you control the regulator, cut-off, and brake. As your ability increases you may add blower, whistle, firing, and injector – gradually building up to total control.

At any point during a run you may call up a timetable which displays the stations on your route, the scheduled time of arrival, and the actual time of arrival for any stations you have passed. From the timetable screen you can access the events log, which provides an up-to-the-minute list of all your blunders.

Having always been a doer rather than a thinker I gave the instructions a cursory glance and then plumped for option two – the training run. This is a straight forward blast from Bath to Evercreech junction – the only constraints being that you pass through each of the intermediate stations on schedule and stop in the correct position at your terminus.

The next two options are based around the same short route but with additional problems: The first sees the appearance of speed limits on the route, the second expects you to stop at stations and obey any signals you may encounter.

Option 5 is similar to the previous run, but is carried out over the full 70 miles. A chance to get your name in the record books is on offer in the sixth option – a non-stop sprint from Bath to Bournemouth.

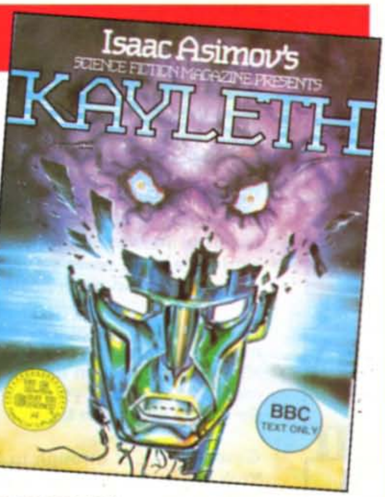
Evening Star has that special something which separates the simulators from the games – realism!

Nev Astly

Price: £9.95 (cassette) £14.95 (disc)
Supplier: Hewson, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.
Tel: 0235 832939

Kayleth

S	G	P	V	O
–	–	9	9	8



THE Zyroneans were an advanced pacifist civilisation, until the arrival of Kayleth and his obsessional craving for Chromazin, a rare mineral found in small quantities on the planet Zyron.

Now, Kayleth rules the Zyron skies with awesome power, using an Atomic Bisembler to send down his powerful army of androids to enslave the Zyroneans and force them to claw out the subterranean rocks to extract the precious ore.

So the scene is set and your task as a loyal Zyronean is to liberate your beloved planet. The quest and philosophy will be familiar enough to all adventurers though the scenario may seem rather outlandish. This is not surprising, as the adventure stems from the Isaac Asimov science fiction stable.

You begin your ominous undertaking strapped down with metal bands in a cell on a spaceship, and escape is impossible if you don't pull the lever.

This is a superbly constructed text-only adventure involving some truly excellent chaining puzzles. For instance, after examining everything on the ship you should have some tape, a canister, a fuse and some gloves.

Wear the gloves, then unseal the tape and wrap it round the canister. This will now dissolve, leaving Dextra, Masta and Serta cartridges. I'll leave you to think about that one, as the chain still has a long way to run.

During the course of the adventure you will become acquainted with some peculiar alien creatures and will need to trade with, question or kill some of them.

You will also become involved in a strange piece of self-discovery if you gaze into the reflective sheet. It certainly frightened me – though I get the same experience whenever I shave in the morning.

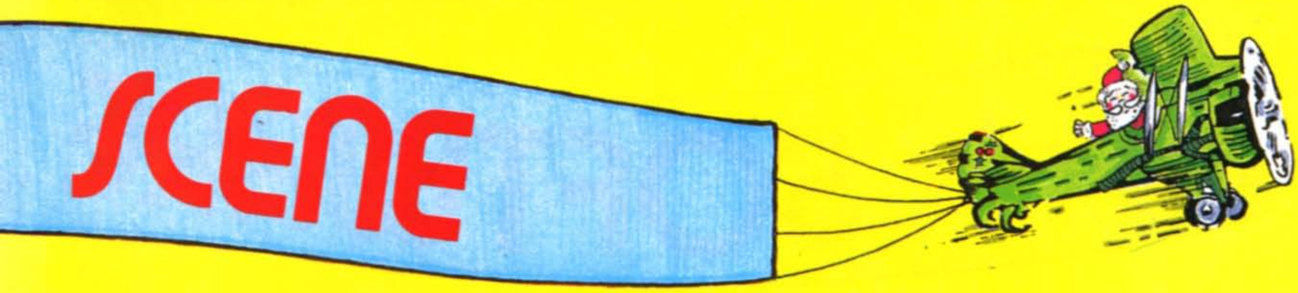
As with all other Adventure Soft adventures which I have seen, Kayleth suffers from a woeful lack of location descriptions, thus paring the atmosphere down to a barely acceptable level.

This stems from the fact that its BBC adventures are converted from other, larger memory, computer versions. It really would pay Adventure Soft to invest in a text compression system such as the Amulet or Shovel 3, as used by Robico and Level 9.

If you can conjure up the images for yourself, enjoy devious puzzles and science fiction to boot, then this is definitely the adventure for you.

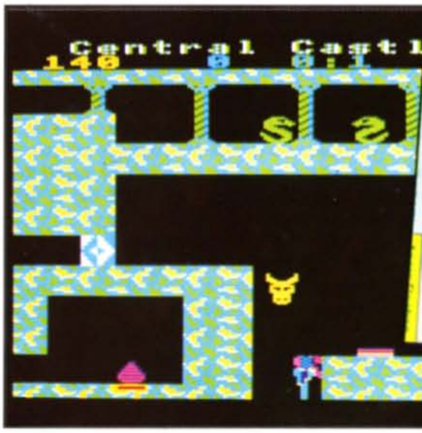
Pendragon

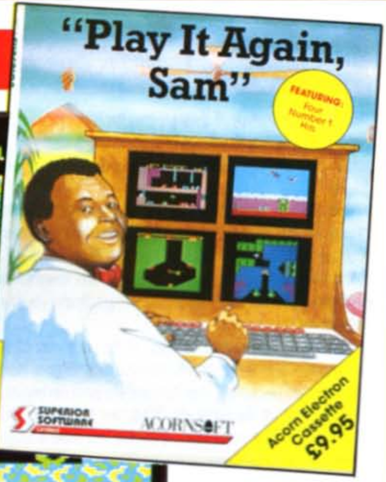
Price: £7.99 (cassette only)
Supplier: Adventure Soft (UK), PO Box 786, Sutton Coldfield, West Midlands B75 7SL.
Tel: 021-352 0847



Play it Again Sam

S	G	P	V	O
6	10	9	10	10





DESPITE what many people think, Bogey never uttered that immortal cliche "Play it Again Sam." However, I suspect that if he'd been around to see Superior Software's latest compilation he'd have been sorely tempted to say "Let me play it Sam!".

The problem with compilations is that all too often they seem to be a vehicle to make some money from useless games, embellishing them with pretty packaging and offering them at bargain prices. Superior's latest release escapes this criticism, containing four of the company's best arcade games.

Citadel starts this excellent collection of classics. The scenario casts you as an intrepid adventurer charged with destroying the teleport system created by Marduk the Dictator. He has established a base in a deserted castle and will soon be using the teleport to bring his invasion force to Earth.

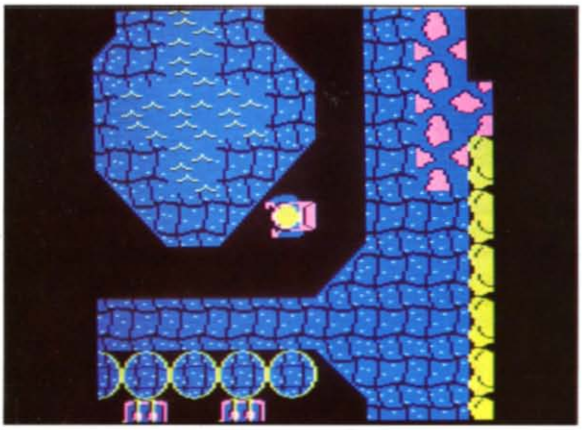
Success won't be easy and you will have to do battle with the guardians of the castle. Some you can avoid, but the strange wandering monks can only be destroyed by a well-aimed spell. Unfortunately they do reappear.

The castle consists of more than 100 individually illustrated locations, each with its own set of bad guys and objects to be collected.

Much of the game involves leg work, collecting items and carefully planning your next move. For those of us whose fingers are not quite what they used to be, I have to admit this is a welcome respite. Fear not though, lightning reflexes do not go unnoticed.

The sound employed is a little basic and the graphics are starting to show their age. However, the game still stands up remarkably well and is guaranteed to provide hours of fun and entertainment.

Price: £9.95 (cassette) £11.95 (5.25in disc) £14.95 (3.5in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453



Second is **Thrust** – a game of subtle control and careful manoeuvreing. Your job is to hover into the depths of a high gravity asteroid and recover an energy pod vital to the resistance.

Pitted against you are nuclear-powered automatic Limpet guns forming the asteroid's defence. By careful shooting you can either disable the reactor for a while or destroy the guns.

Too much energy punched into the reactor will cause it to explode and destroy the entire asteroid. This results in a loss of bonus, but it's a nice way of skipping screens.

There are 24 different asteroids and more than 70 levels, some with increased gravity, reversed gravity, and even invisible landscapes.

The graphics are quite simple but elegant. The scrolling is faultless as you manoeuvre your little spaceship around the tightest corners.

This is one of those games that always seems to have just one more challenge lying in wait, and no matter how many times you get killed you always want that one last go.

Third in line is **Stryker's Run,** the game that took the software charts by storm. You are Commander John Stryker: Your mission, to return top secret information to the allied force's HQ.

While Stryker comes equipped with just a laser pistol and grenades, the Volgon enemy have mortars, mines, rocket launchers and SAM missiles.

Stryker can run, jump and duck to avoid the barrage of enemy fire. Along the way he may utilise the enemy's helicopters to complete his task.

The scrolling landscape and scenery are breathtaking and what it lacks in playability is made up for by sheer fun. If you missed this one on its first release, don't miss it now.

Bringing up the rear is my old favourite **Ravenskull,** an arcade adventure of the highest calibre.

You can choose your character – Wizard, Adventurer, Elf or Warrior. Your choice merely selects the treasure graphics, with the object being to collect and assemble the pieces of a silver crucifix.

You start on the outside of a castle, faced with the first puzzle: How to get in. This can take some time, not least because of the sheer size of the map. Each level is no less than 64 times the size of the screen. Needless to say with a map this large, getting from one place to another can take quite some time.

Once inside the castle there is a variety of different objects and obstacles to be found. Some – the pickaxes for example – are helpful, but others are either a nuisance or just downright lethal.

The puzzles in Ravenskull are nothing less than complex – make one mistake and you'll have to start again. There is only one solution to each level.

The overhead view and the four colours of the Mode 5 display are used to excellent effect.

In conclusion, since every one of these games achieved number one in the software charts, this package represents unequalled value for money. Though you may have at least one of these, this is a compilation everybody should have.

Julia Forester

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

SOFTWARE

Eddie Kidd Jump Challenge

S	G	P	V	O
7	7	7	8	7

THE title of this piece of software may be familiar to many people, as this is a re-release of a game which came out a couple of years ago. Now it carries a budget price of just £1.99.

Your aim is to beat Eddie Kidd's jump record of 19 double decker buses, but before you attempt that feat you must practice with smaller jumps, firstly on a BMX bike.

The bike controls are simple. You can lean forwards or backwards, you can pedal harder or more gently and you can apply brakes.

Your mission starts near the base of the jump ramp. The first problem is to decide how far from the ramp to go to start your attempt. You set off, stop, turn and the jump run begins. After zooming up the ramp and flying over the barrels you land safely on the other side. (Provided you have enough speed you always land safely.)

A couple of jumps on the BMX and then on to the motor bike. The same controls apply, but now gears must be selected as well. Too much power, or the wrong speed in a gear will cause a spill.

Time is needed to master bike control, but before long a jump attempt can be made. On the motorbike any errors are "fatal". If you go too fast or slow, or don't lean correctly, then you crash on landing and return to BMX level for more practice.

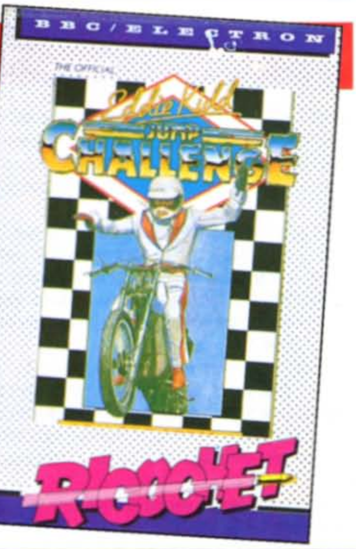
This is a simple but enjoyable game. The graphics are adequate, but the animation is a bit jerky. The sound makes the game far more playable.

Perhaps the worst feature is the "Back to BMX" message. This level needs such a small level of skill that it is a bore to have to work through it.

However, at this price, Eddie Kidd's Jump Challenge is worth adding to your collection.

Rog Frost

Price: £1.99
Supplier: Ricochet, 8-10 Paul Street, London EC2A 4JH.
Tel: 01-377 8411



Superb spy thriller

S	G	P	V	O
8	9	10	10	10

MY name is Bend, Roundhay Bend of the tea service and when *The Micro User* needed someone to review Tynesoft's new game Spy vs Spy, I was their man.

This is one of those pieces of software you pick up, play, and after 20 minutes of fruitless fumbling, concede it's better to read the instructions first.

This is because it is more complex than it first appears and requires a lot of thought and pre-planning.

Take my advice: Don't rush until you know what you are doing. The game can be played by either one or two players, the BBC Micro controlling your opponent if you select the one player option.

Spy vs Spy employs a clever technique it calls simulvision – a system where the screen is split horizontally across the middle, dividing it into two equal sections.

The two spies move independently of each other and their location is shown in each half of the screen – one at the top, one at the bottom. When both are in the same room only one location is shown.

Although similar systems have been used on the BBC Micro (Dunjunz springs to mind), Spy vs Spy's display is much clearer and this makes the game easier on the eye and nicer to play.

Each room is drawn in 3D as if viewed from the front. This makes it simple to judge the relative positions of objects than other 3D games I have played.

Price: £9.95
Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne and Wear NE21 4TE.
Tel: 091-414 4611

SPY VS SPY
BBC
by Mike Riedel
FIRST STAR
TYNESOFT
COMPUTER SOFTWARE

To the right of each playing area is a peculiar looking device called a trapulator. This displays the time remaining, the objects carried, objects found and a booby trap selector.

The aim of the game is simply to recover four particular objects (I won't tell you which, it'll spoil the game) from a rival embassy, pop them in a briefcase and escape back home on an aeroplane.

On the face of it, this may seem simple, but don't forget the other spy is trying to do exactly the same thing, and he's not going to make it any easier for you.

The objects are hidden in a variety of places: Behind paintings, in cupboards, and so on. A nice feature is the way they are shifted around when they're being examined by one of the spies.

As well as the objects you are searching for, you can run into booby traps left by your rival. If you are fast enough you can see where he places them, courtesy of the clever simulvision and either avoid or disarm them.

Unfortunately, you can only pick up and carry one object or tool at once and if you are holding the wrong one, poof, your little guy floats off to that great embassy in the sky, while the other laughs himself silly.

A very useful booby trap is the time bomb, as this can't be disarmed by either spy. Once selected and dropped you have 15 seconds to leave the room or you'll go up too.

The trouble with booby traps is that either player can trigger them, so don't forget where you put them.

The control keys are a little odd, but remarkably well placed, although the BBC Micro's keyboard is a bit cramped at the best of times for two hands, let alone four.

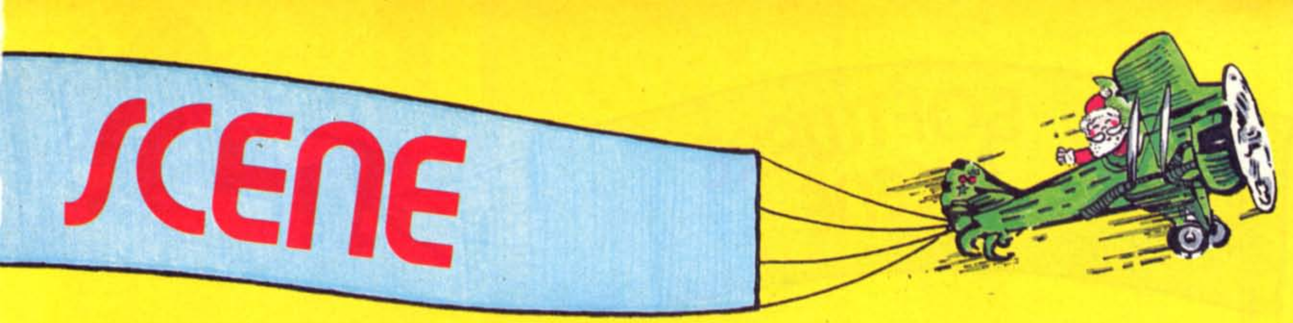
The game is compatible with joysticks so it may be possible to have one player on keyboard and one on joystick.

For graphics and sound the game is excellent and is a credit to the whole programming team.

Overall, I have to say I have never had so much fun trying to outwit a computer at its own game and the sight of your opponent being electrocuted by touching a booby trapped doornob is hilarious.

Due to its complexity, it's not a game for younger children, although it's already caused a few squabbles among my family over who plays next. It is highly recommended.

Roundhay Bend



Hac-Man's Christmas recommendations

CHRISTMAS is traditionally the time for giving, with the latest computer games always to the fore. As usual around this time, all is far from quiet on the software front, with major releases from all the leading software houses, so let's see what's on offer.

Hot off the press from Audiogenic is **Ransack,** a shoot-'em-up from arcade-adventure specialist Peter Scott. Ransack has been seen in a variety of guises over the past few months including, briefly, a Gauntlet lookalike.

In its present form you bounce along collecting weapons and shooting anything you can see, including characters from previous Scott games, such as Spreco – hero of Thunderstruck – and the Omega Orb.

Ziggy by Dean Lester is a fun game in which you guide a cute-looking spring through more than 200 3D rooms in search of crystals. Of course, nothing is as easy as that, so it is no surprise when the higher levels introduce lethal skulls and patches of glue – either avoid or bounce over them.

The game also includes a utility that allows you to design your own screens. This will keep you going long after completing the maze supplied.

Despatch Rider is an action-packed motorcycle game, in which you ride around the streets picking up and delivering mail. But awkwardly placed road cones, jaywalking pedestrians and a variety of other suburban hazards make the poor delivery boy's lot far from easy.

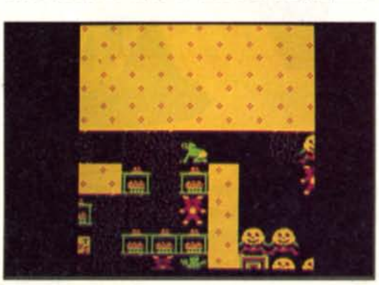
Rumour has it that **Daxis,** the long-awaited title featuring "elements from every popular arcade game", may also make it for the big day. Originally started by Gary Partis, the programming was recently taken over by Peter Scott. It still looks well worth the wait.

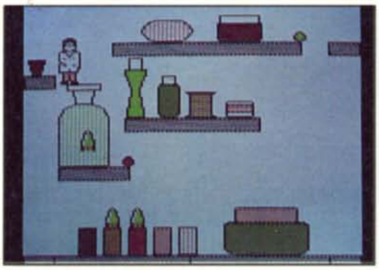
The big release from Tynesoft is **Winter Olympiad '88** (formerly Winter Sports), the company's follow-up to the hugely successful Winter Olympics, released two years ago.

The intervening period has certainly not been misspent: The events in Olympiad '88 feature greatly improved graphics and gameplay. Written by Dave Croft, author of Phantom, it promises to be just as much of a success as its predecessor.

Tynesoft's other Christmas release is **Indoor Sports,** by Kevin Blake of Spy vs Spy fame. As the title suggests, it features games such as Table Tennis, Ten Pin Bowling, Darts and Airball. Like Winter Olympiad, if this is your type of game then you won't find anything to beat it.

The Superior/Acornsoft stable will also be challenging hard for the coveted Christmas No. 1 spot, with a bevy of excellent releases. First out of the bag is Superior's second set of 40 add-on screens for Repton 3, entitled **Life of Repton,** which takes our little green pal from babyhood to old age.





The first set depicts Repton in a nappy crawling around his nursery in search of teddy bears. Time passes and Repton goes to school. As is to be expected, pushing the teachers off their desks can have catastrophic results.

A few years on and Repton becomes a punk, complete with orange mohican. When he's dressed like that is it any wonder the mods aren't friendly? Repton also discovers, to his cost, that smoking is a very unhealthy habit!

In time Repton becomes respectable, in an office job – although with his boss on the warpath and floppy discs flying all around, what would he do without a refreshing cup of coffee?

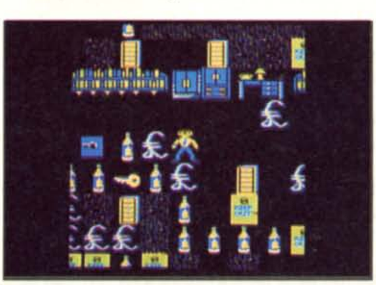
The final set shows Repton as an old man in search of his collection of war medals, dodging the grandfather clocks falling all around him while avoiding his wife in hot pursuit. According to Richard Hanson, Superior's managing director, Life of Repton is "just a little more difficult than Around The World".

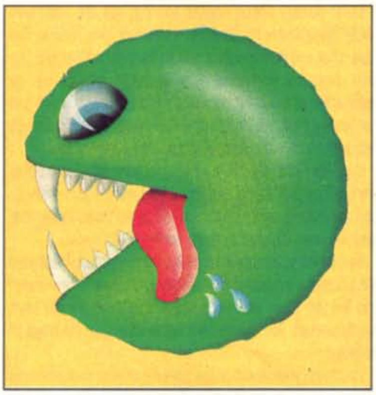
Superior's other new titles are three arcade-adventures: Elixir, Spellbinder and Bonecruncher. In **Elixir** you play the part of Cyril the Chemist, who has taken the wrong potion and been shrunk to the size of a bottle of aspirin. Being a chemist he does, of course, have an antidote, but unfortunately it is on the top shelf of his shop.

To reach the much-needed elixir you must amass 2000 points – 50 are gained for each red pill consumed. Yet there are five other coloured pills in your path which have various effects...

The scenario for **Spellbinder** is as follows:

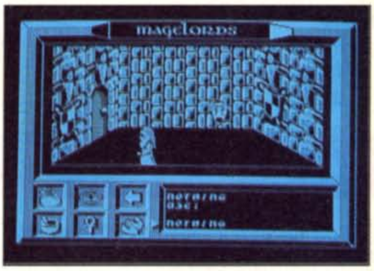
In the middle of Lorraine there is a castle surrounded by three citadels and the Great Ardan Forest. The council of the Magelords meet here monthly. All was peaceful until the day Zorn killed Klere. His action and new guests at the castle caused the three other magelords to flee to Arcaana.





Zorn controls the castle's evil inhabitants by use of the Thunder Hit – to combat this the magelords must enter the castle. Merlan tried and failed leaving you as either Alber or Eldon to find the ultimate spell to negate Zorn's actions.

The game features more than 100 screens and a variety of evil creatures. To succeed you manipulate a number of spells – some destroy the nasties, some protect you, some open doors and so on. To make up the spells you must, of course, mix the right ingredients in the right order.



Bonecruncher also takes place in a castle, but with a quite different story line. You are cast as Bono, a little green bug-eyed monster complete with fangs, who has set up his own soap business.

Aided and abetted by your friend Fozzy you must collect the skeletons littered around the castle and put them in the cauldron. They become bars of soap which you then sell to the monsters bathing in the castle's moat.

Compilations are also popular Christmas presents, and all the recent collections provide excellent value for money. **Powerpack II, Five Star Games II, the Acornsoft Hits** and the **Superior Collections** – including the latest, **Play It Again, Sam** – spring to mind.

To be honest, I really couldn't pick a Christmas number one – each of these titles has much to recommend it, as have several older games that would also make excellent presents. Let's just say that this Christmas promises to be the most exciting yet.

Hac-Man

SOFTWARE SCENE

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

The Hunt (Search for Shauna)

S	G	P	V	O
–	9	10	10	10

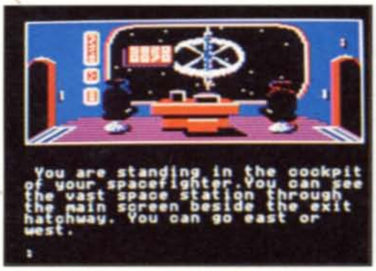
A 59TH century space cruiser soaring into the unknown, boldly going where no other adventure has gone before. The cover shot and introduction seem somewhat familiar, but The Hunt ranks as something of a deviation and gamble by Robico. Not only is it the company's first adventure which has not sprung from the hands of Rob O'Leary, but also it is its first venture into the field of graphic adventures.

It is, I believe, a gamble which has paid off. The puzzles are devious but logical, as you would expect from Robico, and the graphics are superb. I would go so far as to say that they are even superior to those in The Lost Crystal.

As pilot of an intergalactic space craft, you have searched the galaxy for a missing crew member, Shauna. Your mission has led you to an enormous space station where you have finally docked, your space craft battered and on the verge of collapse.

You begin your quest at the console of your ship with only 60 seconds to space exposure. As with all Robico adventures the start is gripping and can be deadly if you don't equip yourself quickly.

No sooner do you escape from the confines of your ship than you have to face the rigours of intergalactic customs – I would suggest that you check your itinerary before doing so. If you succeed, the adventure begins in earnest.



```
You are standing in the cockpit
of your spacefighter.You can see
the vast space station through
the main screen beside the exit
hatchway. You can go east or
west.
:
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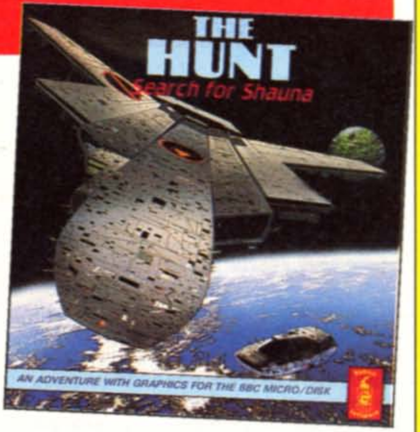
The superb advanced parser enables your micro to seemingly understand almost any prompt which you type in – as long as it has something to do with the game.

My one and only criticism of The Hunt, is that I feel the location descriptions lack a little of the atmosphere of the Robico text-only adventures. However, the descriptions created in each location are layered to give just enough clues to help with the problem solving. Your search will be difficult but not impossible and the conclusion is rewarding.

If for some strange reason you don't like graphic games, the simple command GROFF will let you play the game in text-only format.


THE HUNT
Search for Shauna
AN ADVENTURE WITH GRAPHICS FOR THE BBC MICRO/DISK

I understand that this is just the first of many alliances that Robico has made with out-of-house authors. If this is evidence of the calibre of adventures to follow, then you had better start saving your pennies fast.

This is without doubt the best graphic adventure I have seen for any home micro and is an essential purchase for any discerning adventurer.

Pendragon

Price: £9.95
Supplier: Robico Software, 3 Fairland Close, Llantrisant, Mid Glamorgan CF7 8QH.
Tel: 0443 227354

The Great Wall

S	G	P	V	O
8	7	7	7	7

THE Great Wall tells of runners carrying military messages during times of conflict. You have been selected and your training consists of running along a wall which separates two warring factions.

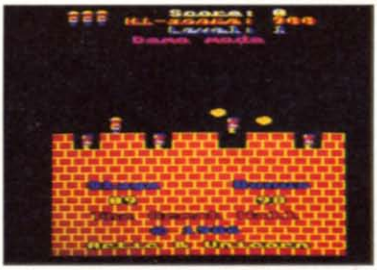
On your way, a variety of missiles are hurled at you and you only have your wits to defend yourself. You must avoid contact with vast numbers of arrows, cannon balls, rocks – and guards – by either dodging under them or jumping over them.

Also to be avoided is falling into the harmless-looking crenellations along the wall.

Nothing presents much of a problem on its own – your troubles start when a guard approaches one way, a rock bounces up from the other and you have to cope with a conveyer belt crossing.

Your performance as a runner is based on time. Spend too long on a section of wall and you lose one of your four lives. You must aim to traverse 64 sections of wall just to complete the first of the eight levels.

The scenario might have changed, but you've probably realised that The Great Wall is a game of the Hunchback type. It offers nothing particularly new, but it does have some well thought-out features.



I always like the text characters which Artic uses. The flowing script is a pleasure to read and gives the game a professional feel – it's a pity it looks like Greek on a Master.

You cannot define the main keys (left, right and jump), but the use of Shift means that left or right-handed players are suited. The graphics are pleasing if fairly simple, and animation is adequate.

Perhaps the best feature of the program is the sound. For starters it can be turned off entirely or you can choose from four "backing" tunes. A third option allows you to keep the sound effects without the music.

THE GREAT
WALL
BBC/ELECTRON

The Great Wall is a simple, fun game which represents good value for money.

Rog Frost

Price £1.99
Supplier: Artic Computing, Main Street, Brandlesburton, Yorkshire YO25 8RL.
Tel: 0401 43553

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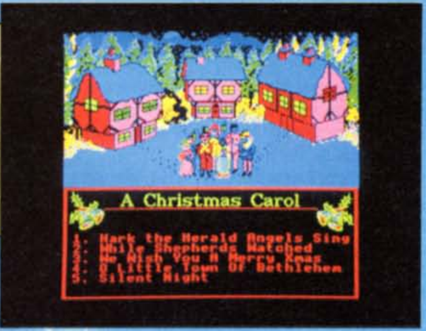

A Christmas Carol

1. Hark the Herald Angels Sing
2. While Shepherds Watched
3. We Wish You A Merry Xmas
4. O Little Town Of Bethlehem
5. Silent Night

BBC MICRO
ELECTRON

SNAP!
CHRIS
Acorn

Put some sparkle into your Christmas!

Sc:296
SCR#2
SP:2

TO ORDER TURN TO THE FORM ON PAGE 149

MU12

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

SOFTWARE SCENE

Triple Decker 1, 2 and 3

S	G	P	V	O
5	7	7	8	6

TRIPLE Deckers consist of three games on cassette sold at one budget price, which sounds as though it must be a bargain. The three games on the first of the series are Grand Prix, Manic Mole and Day at the Races.

It will come as no surprise that **Grand Prix** is a motor racing game. You see a plan view of a track with four midget cars. One of these lethal machines is yours and it is locked in gear. Not only that – the accelerator is full on as well.

All you can do is steer round the track, avoiding the other cars, getting knocked sideways by collisions while the three computer-controlled racers hardly seem affected.

After five frenetic laps, the race is over and a result sheet gives your position. This is a simple game and not of outstanding quality.

Manic Mole is a platform game written in pure Basic. The aim is to collect a jewel from each room so that your girlfriend can be released. The only moving object on the screen is the mole – driven by you – so speed is quite good.

The first couple of rooms are easy, but then slides and dissolving platforms rear their ugly heads. Manic Mole is hardly eye-catching, but it is quite a neat bit of programming.

Day at the Races is a game for addicted gamblers. Choose your computer horse, bet your pretend money, watch a random race and collect your imaginary winnings.

I don't understand why anyone should want to do this, but for those who do, at least there is the satisfaction of a near guaranteed win – the bookies in this simulation offer incredibly generous odds.

Collection 2 in this series gives you Invasion Force, Haunted and Parachute.

Invasion Force is a simple, if fairly fast, space invaders. The Mode 4 graphics (just two colours) are rather dull and the whole process seems a little too easy. I'm not usually very good at shoot-'em-up games but I soon got bored with my own success here.

Haunted by Peter Scott is in a vastly better league. This machine code game has you rushing around a room collecting keys and other goodies while avoiding or shooting the meanies.

Success in a room leads you to a new and more challenging one with more problems to overcome. To keep you on your toes, there is a time limit as well. The graphics and sound make this game a pleasure to play.

In **Parachute** a helicopter is releasing its huge cargo of lunatic parachute jumpers. These idiots are jumping into a river which is well stocked with man-eating sharks.

You can save these unfortunate half-wits if you manoeuvre your raft to catch them and then transfer them to the jetty. But you can only carry one parachutist at a time and they arrive thick and fast, so speed and care are required.

Parachute is not a brilliant game: The animation is jerky, and the choice of colours makes the parachutists hard to see.

Triple Decker 3 brings us Lunar Invasion, Jam Butty and Lunar Lander.

Lunar Invasion is set on the surface of the moon. You have volunteered to fight off the invaders, armed with a type of buggy and an anti-aircraft gun. Wave after wave of aliens stream past – some are harmless, mere target practice, but others produce lethal showers of missiles.

Any hit from these reduces your shield and the game is over when you have no shield left. Good sound and smooth, fast graphics make this game a winner.

Jam Butty is another platform game. Your aim is to pinch all the sandwiches from a building site while the workers are holding a meeting.

This game has lots of smooth sprites, but control of your rather plump man is difficult – I have yet to complete the first room. The game is well laid out, with good title pages and pleasing sound which can be turned off.

The final program is **Lunar Lander,** which is very much a make-weight. The landing craft has the usual left, right and up controls, and it must be landed on the flat part of the screen at a very low speed. A further aim in this version is to use a minimum quantity of fuel.

Unfortunately, the graphics are far too jerky and the sound is horrid as well: There are plenty of better lander programs around.

Overall these three packages do represent reasonable value for money. Perhaps the first is poorer than the others but Haunted and Lunar Invasion could easily stand as budget games in their own right. The extra games can then be regarded as something of a bonus.

Rog Frost

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DAY at the RACES
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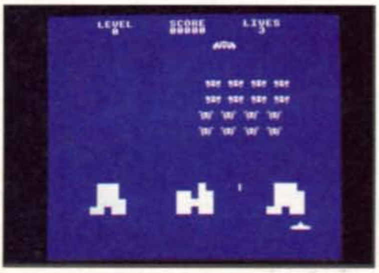
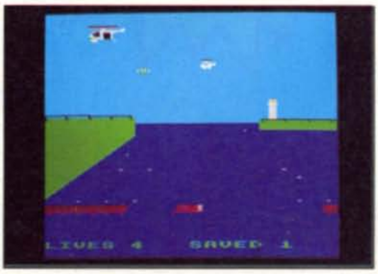
199 RANGE
LUNAR INVASION
LANDER
TRIPLE DECKER 3
199 RANGE





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Desktop publishing on the BBC Micro

What you get is, what you pay for, says Will Gallagher

IN the last year or so there has been much written about desktop publishing (DTP), and there has also been a great deal of money made over it, too. This month we shall see just exactly what DTP is, why it is such big business – and also how the BBC Micro has an important part to play.

DTP is simply printing using computers – printing almost anything from newsletters to magazines or even books. And the computers involved can be anything from a home/small business machine such as the BBC Micro to a dedicated mainframe.

Apart from the hardware used, DTP does not sound very impressive – or at least until you think of the effort it takes to produce a newsletter or a sales brochure. With a brochure especially, it is easy to see that the printing and layout must be excellent or custom could be lost. Excellence costs, of course, and the computer is ideal for reducing the time taken.

Let's talk about publishing just one page, perhaps the page you are reading now. As it happens, most professional typesetting is organised around the single page, and so, too, are most DTP systems.

Writers and journalists write the copy and someone plans the layout of the page as a whole. This is very much a skill in itself, in fact anyone using a DTP package should have a good grounding in the rules of layout otherwise the end results will not justify the cost.

Previously many firms left it up to the typesetting house to do what they thought best. The typesetters ran off a galley proof and a rough printout of how the page would look when finished.

This proof was made by printing the rough copy sent in to the typesetters and was expensive, particularly so when you realise that it would never be seen outside the firm.

The company wanting to print a nice little sales brochure now needs to check for literals – spelling and grammatical mistakes – then back at the typesetters the page is run through again. And again.

Finally, we have a presentable page with no literals. And the managing director decides he/she just doesn't like it. So you start over again. Before this gets mindlessly repetitive, perhaps we had better move on to how this costly venture can be simplified.

Beside me as I write is the galley proof for the manual of a DTP system. As it is for a very expensive and professional system, the manual is rather large. Although just about to be published, the text in it hasn't been near a typesetter.

The galley has been run off on a laserprinter, and straight away you can see how much time is saved, since it takes moments to run off a page, correct it, and run it off again.

However, it wouldn't be dramatically slower to produce on a typesetter – if you had one next to your computer – so real speed increases must come from elsewhere, and they do. Instead of being a dumb typewriter, the computer is used to manipulate the text and graphics for laying out the page.

Page layout – or page make-up – is a matter of deciding the columns, the fonts (how the letters look – as in the difference between the typestyle of this sentence and the style of the title) and fitting the text into the available space.

Once more it is a case of *if you get it wrong, you start again*. Page layout by hand involves a lot of cutting and pasting of pieces of text to make them fit. And it's not unknown for sections to get dropped and lost.

Using a DTP package this can't happen, and often the words are "poured" into the columns from a file to be automatically fitted by the system.

But, as mentioned, a lack of skill in placing the columns and selecting styles can produce awful results.

The term desktop publishing is said to have been coined by Aldus, which markets the successful Pagemaker product. The system comprises the Pagemaker software, a computer and a laserprinter for a cost of £10,000. Even for a business, this is not a small sum, and it is a measure of how valuable companies consider DTP to be that these systems sell so well.

If DTP systems are so very expensive, how can they possibly be of use to the home and small business computer user? While £10,000 is at the high end of DTP (although it is by no means the most expensive option), at a much lower price there is the AMX Stop Press package, which sells for £50 or so. With a mouse (usually considered essential), a dot matrix printer, monitor and discs, it comes to around £1500.

Still too high? It certainly is for me, but then I do not need to produce a newsletter. Perhaps if I was part of a large team working on a sheet that could be printed on dot matrix, I might consider it.

Before you get totally demoralised, don't forget that if you already have a BBC Micro (B, B+, Master), a monitor, disc drives (although tape can be used – just barely), a dot matrix printer, and a mouse, all you need do is buy the software.

So what is the difference between the £50 option and the multi-thousand one? In a word, quality. Not so much *What You See Is What You Get*, more *What You Get Is What You Pay For*.

Every DTP system works on the same basic principle: Text entry, processing (page make-up), printing. If this rings bells with you, that's because it should. For this is what every computer program ever made does: Input, process, output.

The difference between the systems and the cost is in just how well they do these stages – especially the last two.

Text entry is so called to differentiate it from word processing. Both are the keying of text, but DTP text entry is merely concerned with getting words into the system, not doing any processing like justification and so on.

The idea is that DTP text entry is for the copy typist who will pound away at the keyboard with very few mistakes and, hopefully, no editorial changes.

However, if you are paying several thousand pounds for one piece of software you will not want to tie it up for a few hours of text entry, or in the case of packages like Stop Press on the BBC Micro, you may well find the text editing facility too limited to be of use for anything over and above copy typing.

So you need a word processor to write text for a DTP system. For ease and compatibility, DTP systems need so-called pure text, or in other words straight Ascii files.

Word processors produce text files with Ascii and various other codes. In most cases the letters, numbers and spaces that you type are stored in Ascii form, and only margin stops, tabs and printer commands are stored among your text. That is roughly how it is with View, Wordwise and Mini Office II, but Interword can only be described as vicious in what it does to your text.

If you manage to wring pure text out of your word processor, it should be fairly straightforward to read it into a DTP system. Unfortunately, they all do this in different ways, so at the risk of sounding like Acorn, that is beyond the scope of this article.

I am avoiding the subject of how you select effects like differing fonts because often it is not the province of the use of the text entry system – for example I have only the most approximate idea of what fonts will be used by the time you read this – and also because systems vary.

Some, possibly most, use embedded commands, the idea of which is no doubt very familiar to Wordwise and Mini Office II users.

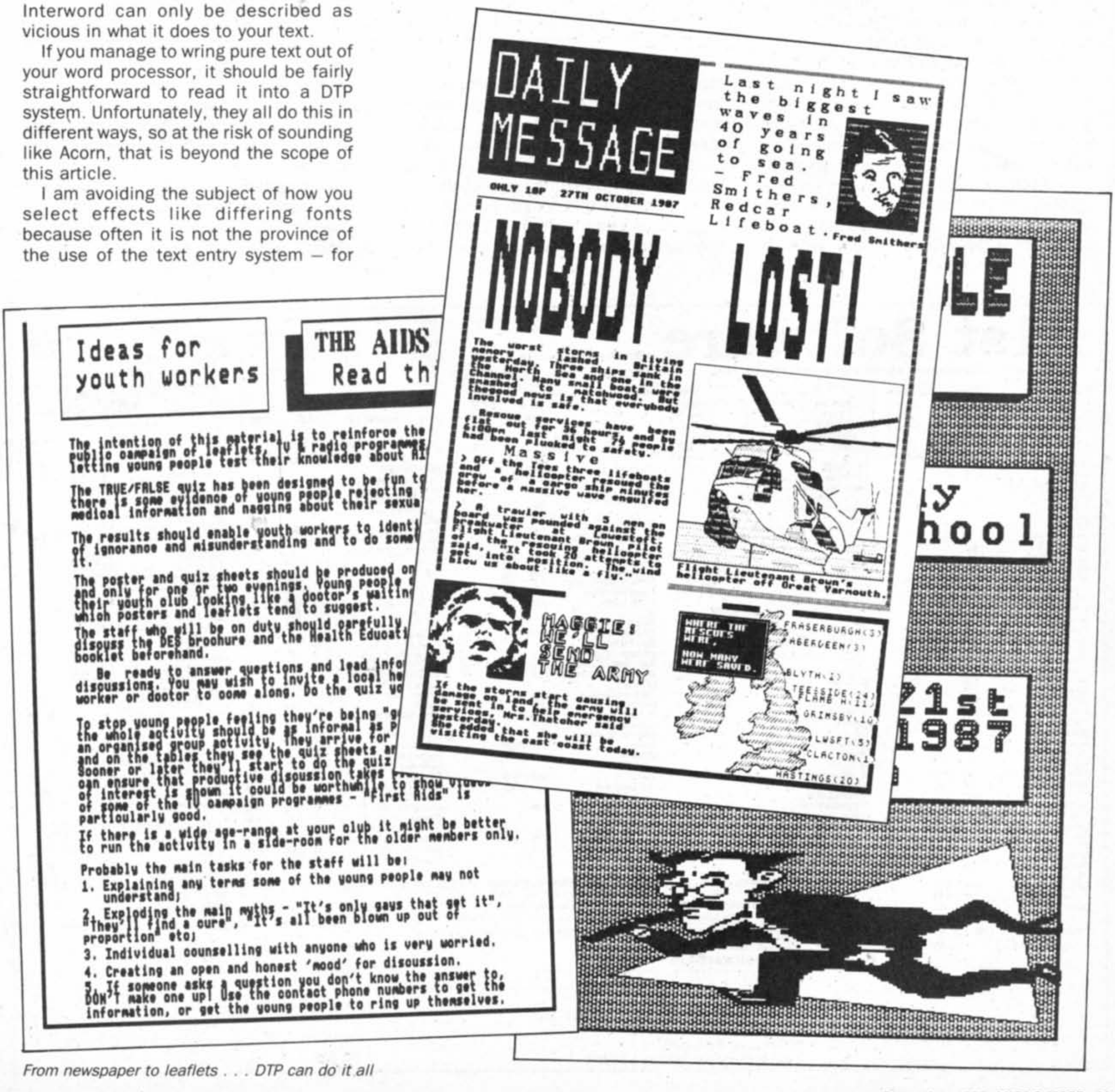
The most interesting parts of any DTP system are the components of the processing stage. Summed up as hyphenation and justification, this process involves fitting the maximum number of words into a specified column width.

As with word processors, DTP systems avoid splitting words across lines at all costs, but where it is unavoidable the better ones can hypenate words by their suffix, their prefix, or even by making an estimate of their apparent syllables.

One major problem is that certain words must not be split in certain ways – the famous example is that of the word *therapist*, which can be split into *the-rapist*.

The goal is a page which contains lines of text that break unobtrusively and

Turn to Page 42 ▶



LE
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1987

Ideas for
youth workers

THE AIDS
Read th

The intention of this material is to reinforce the
public campaign of leaflets, TV & radio programmes
letting young people test their knowledge about AI

The TRUE/FALSE quiz has been designed to be fun t
there is some evidence of young people rejecting
medical information and nagging about their sexua

The results should enable youth workers to identi
of ignorance and misunderstanding and to do some
it.

The poster and quiz sheets should be produced on
and only for one or two evenings. Young people
their youth club looking like a doctor's waitin
which posters and leaflets tend to suggest.
The staff who will be on duty should carefully
discuss the DES brochure and the Health Educati
booklet beforehand.

Be ready to answer questions and lead info
discussions. You may wish to invite a local he
worker or doctor to come along. Do the quiz yo

To stop young people feeling they're being "g
the whole activity should be as informal as p
an organised group activity. They arrive for
and on the tables they see the quiz sheets ar
Sooner or later they'll start to do the quiz
can ensure that productive discussion takes
of interest is shown it could be worthwhile to show videos
of some of the TV campaign programmes - "First Aids" is
particularly good.

If there is a wide age-range at your club it might be better
to run the activity in a side-room for the older members only.

Probably the main tasks for the staff will be:
1. Explaining any terms some of the young people may not understand;
2. Exploding the main myths - "It's only gays that get it", "They'll find a cure", "It's all been blown up out of proportion" etc;
3. Individual counselling with anyone who is very worried.
4. Creating an open and honest 'mood' for discussion.
5. If someone asks a question you don't know the answer to, DON'T make one up! Use the contact phone numbers to get the information, or get the young people to ring up themselves.

DAILY
MESSAGE

ONLY 10P 27TH OCTOBER 1987

Last night I saw the biggest waves in 40 years of going to sea. – Fred Smithers, Redcar Lifeboat.

Fred Smithers

NOBODY LOST!

The worst storms in living memory lashed Britain yesterday. Three ships sank in the North Sea and one in the Channel. Many small boats were smashed to matchwood. But thegood news is that everybody involved is safe.

Rescue services have been flat out for 36 hours, and by 6:00pm last night 79 people had been plucked to safety.

Massive

> Off the Tees three lifeboats and a helicopter rescued the crew of a cargo ship minutes before a massive wave engulfed her.

> A trawler with 5 men on board was pounded against the breakwater at Lowestoft. Flight Lieutenant Brown, pilot of the rescuing helicopter said, "It took 20 attempts to get into position. The wind blew us about like a fly."

Flight Lieutenant Brown's helicopter off Great Yarmouth.

MAGGIE: WE'LL SEND THE ARMY

If the storms start causing damage on land, the army will be sent in to help emergency services, Mrs.Thatcher said yesterday.
She added that she will be visiting the east coast today.

WHERE THE RESCUES WERE.

HOW MANY WERE SAVED.

FRASERBURGH(3)
ABERDEEN(3)
BLYTH(2)
TEESSIDE(24)
FLAMB H(11)
GRIMSBY(10)
LWSFT(5)
CLACTON(1)
HASTINGS(20)

From newspaper to leaflets . . . DTP can do it all

◀ *From Page 41*

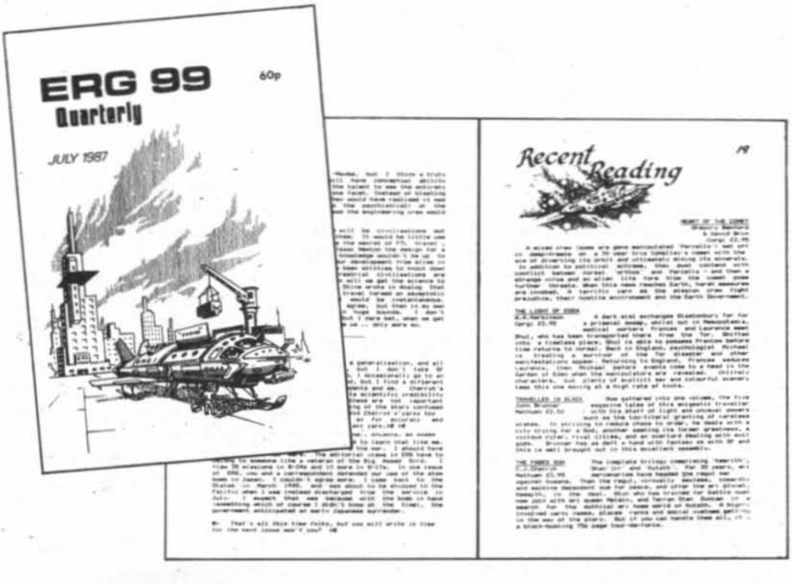
flow smoothly from one column or page to the next.

Space left on a line after the maximum number of words have been fitted on is calculated and divided evenly between the gaps that lie between words. This involves kerning, or in a slightly different form micro-justification, to make lines look as neat as possible.

If you've ever been irritated by the fact that on a dot matrix printer an i is the same width as an m, you will appreciate how important it is for DTP packages to be able to push them closer together.

The point of all this is that once you have entered and processed your text you can print it and achieve some measure of quality without all the expense of external typesetting and layout – assuming you've got the necessary skill.

Printing, or output, is how the various systems differ the most – apart from cost, of course. Stop Press can only output to a dot matrix printer, but can produce pages that look far better than the old typewriter and stencil method that schools and colleges use, and so is ideal for newsletters. But the bigger packages use laser printers which can produce superb results very rapidly.



An article of this length cannot hope to guide you through the DTP area properly, but at least by now you should have an idea of what it all means.

Several DTP packages are available for the BBC Micro – Stop Press, Fleet Street Editor and Typesetter! for schools.

With desktop publishing software you could end up spending more than you need, so make sure you check out the product before you buy.

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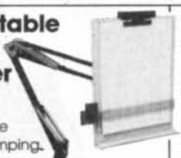

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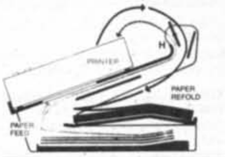

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QA

Q **Is it possible to use existing roms/eproms for the BBC Micro on the Archimedes?**

A *With the addition of the rom board podule and using the 6502 emulator it will be possible to run some rom software, which must be fully Tube compatible to function.*

Q **Will software like dbaseIII, Supercalc and Smart, which are available for most business computers, be on sale for the Archimedes?**

A *The individual items you mention may not themselves be available (except perhaps on the PC podule for the Archimedes) but equivalent or superior software will be on the shelves very rapidly.*

Q **If I upgrade a A310 with a Winchester hard disc will it be fitted internally with a fan, or will it need a backplane and podule so that it is fitted externally?**

A *The hard disc and fan will be fitted internally in the space provided and no podule space will be taken up – all podules are fitted internally anyway.*

Q **I read somewhere that the 80386 chip does a multiplication twelve times faster than the ARM chip. Is this true?**

A *It is true that if you time the actual internal multiplication that the 80386 is faster. But this doesn't take into account instruction decode time and memory access time which makes the ARM lightning fast and totally outstrips the 80386.*

Timings like this also depend on the clock rates at which the chips were compared – a Porsche 924 driven at 20mph is slower than a Citroen CV2 at 30mph, but which one is more powerful? In order to achieve its speed the 80386 is driven at a clock rate of 12MHz or more and needs special (expensive) memory. The ARM operates with normal memory chips at 4MHz, but can be run at 14MHz or more if you add the fast memory.

We are receiving a large number of questions about the Acorn Archimedes. Some of them are answered here, and we will be answering more over the next few months.

So, if you have any questions about the new super micro from Acorn don't hesitate to send them to: Archimedes Questions, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Q **Could you outline the functions of the various podules for the Archimedes and explain how they would be fitted?**

A *In the A305 and A310 you need to have a podule backplane fitted and on to this you can add two podules. The A420 and A440 has a built-in backplane which will take four podules. The operating system is designed to accept more than four podules – in the same way that the BBC Micro could handle more roms than its four rom sockets.*

The podules that will be available soon are: Ports podule giving a 1MHz bus, user port and analogue joystick port, rom podule allowing software to be run from rom/eprom, Midi podule to provide Midi connections and control software for musical instruments and the MSdos podule for PC compatibility.

Another company is producing an IEEE standard interface for electronic scientific equipment interfacing.

Q **Have you heard anything further about Basic V for the 6502 BBC Micro family?**

A *Basic V is available from Tubelink for any BBC Micro with a second processor. It provides all the non-Archimedes specific commands such as WHILE...ENDWHILE, CASE, MOUSE, multi-line IF, and so on. To use the MOUSE commands you need a driver for the particular system that you have. Tubelink provide mouse driver software for the AMX mouse and the Nidd Valley mouse.*

Q **In the September issue of *The Micro User* it said that it would be impossible to transfer data to the Archimedes from a 5.25in disc. But some companies are advertising 5.25in disc drives for the Archimedes. Who's conning who?**

A *The Archimedes Q&A said it would be difficult to connect a 5.25in drive. The main reasons for this are the disc in drive detection which is not available on 5.25in drives but which the Archimedes ADFS uses, and the relative slow access time of a 5.25in drive as compared to a 3.5in drive.*

Having solved these hardware problems you would still only have the ability to read and write ADFS discs, so a DFS module would need to be written to read the standard DFS disc – ensuring single density was used by the WD1772 chip. Once all these hurdles were passed you could read and write 5.25in DFS discs easily.

Q **In David Braben's article last month he mentioned that ARM code was longer than 6502 code for similar functions. Could you explain this please?**

A *This is quite simple. Since each and every ARM chip instruction is exactly four bytes long then, on average, the code itself is longer. In ARM code loading a register with a number always takes four bytes, in 6502 code it takes either two or three bytes depending on the exact instruction.*

However, the overall number of instructions to perform a particular function will be less than 6502. And the speed of the chip is not adversely affected since it deals with all instructions in blocks of four bytes.

Q **Assuming that I continue to write programs purely in Basic what facilities of the Archimedes will I be missing?**

A *Although the improvement in speed may not be essential in some Basic programs the additional memory is a definite bonus. The extra screen modes and colours can improve your program display, as can the Wimp Manager and special font displays. The sound system is harder to handle than the one on the BBC Micro, but is very effective when in use.*

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Double stepping

I KNOW that an article was published in *The Micro User* about a year ago describing how to fit a 40 track switch to 80 track disc drives (double stepping).

Could you please identify the magazine issue so I can order a copy? – **R.J. Kirkham.**

● *The October 1985 issue is the one you are looking for.*

Light buggy

FOR my GCSE course in Technology I want to design a buggy controlled from a BBC B that can turn towards a light source and also move to it. Is it possible for you to provide information about buggies and sample circuit diagrams? – **Philip Lucas, Sunbury-on-Thames, Middx.**

● *You will find a series of articles about constructing a buggy in the September to November issues of* Electron User *and, apart from minor program modifications, this would work on a BBC Micro.*

Back issues of Electron User *and* The Micro User *are available for £1.50. See the order form on Page 149 for the address.*

Unresponsive keys

I FIND that at frequent but irregular intervals my BBC Micro will not accept the up and down cursor keys, Return, Copy or Delete. I have tried playing about with the keyboard connector but this has no effect. Please can you help me? – **R. Shah, Essex.**

● *All these keys come from pin 9 of IC3 on the keyboard. As the left and right do not seem to be affected there must be a crack in the track of the printed circuit board after these keys.*

The simplest solution is to trace the track from pin 9 to the first non-working key you find. Then solder a wire from pin 9 to the key.

Interference

I HAVE recently bought a teletext adapter but it seems to have caused a tape problem. Saving any program, whether teletext or typed, causes endless DATA? or BLOCK? errors on re-loading. The only way to cure this is to turn off the teletext adapter just before pressing Return after the Record then Return prompt.

Please can you tell me what is wrong with my computer. Has it a fracture in its circuit board or does it just need an overhaul? – **P Wright, Stilton, Peterborough.**

● *Any teletext adapter is in effect a television set without the display and has many high-frequency signals floating about inside.*

Unfortunately for you some of these signals are getting inside the tape recorder and causing interference. If you play a tape with the adapter on and then off you will hear the difference and see what I mean.

By definition your tape recorder is at fault because it is acting as a radio receiver when it is supposed to be a tape recorder.

You could try routing the leads away from the teletext adapter and also making them as short as possible. You could also try wrapping the leads through a large ferrite ring.

It is in theory possible to fit suppressor components to the recorder, but this might be tricky to do. In the last resort I am afraid you will have to get another recorder.

No play back

MY BBC Micro will allow programs to be saved to tape but will not allow programs from tape to be played back. But when I type:

```
*TAPE
CHAIN""<RETURN>
```

it can control the cassette motor. Is it my recorder or is it the Micro? I am sure it is not the lead. as I bought a new one. – **Rickie Sharma, Strabane, Co Tyrone. N.I.**

● *First make sure you are really recording a program on to your tape by playing it back and listening to the audio sound. It should be clear and sharp, with no distortion – although the tune is unlikely to make the Top Ten.*

Then you must see if this sound is getting back into the computer. If you have no test equipment you could improvise with a high-impedence crystal earpiece.

Put one lead on to the metal box in the corner of the computer and place the other on pin 3 of the cassette input socket. If this is fine your lead is OK, so move the earpiece to pin 12 of IC7, the ULA close to the back of the board.

If no sound is heard IC35, the LM324 chip, has blown. This chip can be damaged by some recorders as they produce too much signal. If the sound reaches here the serial ULA (IC7) or the ACIA (6850 IC4) are probably the culprits.

Securing sensor

I RECENTLY bought the Pulse Monitor that was described in the April 1984 issue of *The Micro User* for my BBC Micro. It works well, but do you know of any better fixing pads to the skin?

I want to use it while a friend and I do some weight training, but at the moment it is very difficult to secure the sensor. I am sure that some hospitals must use the same sort of equipment. Is it possible to obtain the same fixings as them? – **C.M. Speed, Leeds**

● *This is a problem with taking readings while moving, because the movement often causes a change in what you are measuring. However you could try clipping the sensor and emitter across the lobe of your ear. You would then be using transmitted and not reflected IR.*

The output from the emitter might be too strong, in which case you could try reducing it by increasing the value of R21. Unfortunately I have not tried this so I can't guarantee it will work.

I have seen the ear lobe transmissive method of pulse monitoring working in a hospital, so it should be possible.

Expanding

I HAVE a BBC Micro (OS 1.20) with an Acorn DFS (1.20). The only non-standard feature is a ZIF socket fitted to one of the four resident rom sockets.

I am considering expanding with an HCR external rom unit (with sideways ram capability) and/or an Aries B-32 shadow ram board.

Both require circuitry to be fitted inside the computer, and I would like to know if you or your readers are aware of any adverse effects these may have on software compatible with a standard BBC Micro.

The reason for my concern is

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explained by the problem I have experienced with Computer Concept's graphics rom. When it is resident in the ZIF socket numerous programs fail to work, especially machine code games.

Even with the rom turned off and using *EXEC !BOOT to avoid re-setting, many games still fail to work. Can the rom/ram control circuits produce similar problems?

Also, the graphics rom manual states that disabling the rom has the same effect as removing the rom from the machine. Clearly this is not the case in my experience. – **Dr. D.A. Jarvis, Norwich, Norfolk.**

● *Any expansion of a computer runs the risk of producing some incompatibility or undesirable side effects. What appears to be happening is that either the crashing programs are reactivating the graphics rom or they are deliberately crashing themselves.*

This is a copy-protection technique some programs use to avoid copy roms. They look through all the sideways roms and if they spot or think they spot a copy rom they crash. In this case only the physical removal of the offending rom will work.

Both the Aries and the HCR board look like many sockets to the operating system. There should be no problem from the rom/ram control circuit, only the roms you place in them.

Upgrade to 1.2

I HAVE a standard BBC B with Acorn 0.9 DFS and 1.2 OS. My problem is that I would like to upgrade the 0.9 DFS for a 1.2 DFS. I would like to know what exactly is involved. Is it just a matter of removing the 0.9 DFS chip and replacing it with the 1.2 DFS?

Also, will all my present software on disc still be compatible with the new DFS? Are the advantages in this exchange sufficient to warrant the upgrade, and is there any place that offers an exchange service of this kind? – **D.L. Pereira, Swanmore, Hants.**

● *Yes it is as simple as swapping the chips. As far as I know there is no problem with software compatibility. However the advantages in the upgrade are slight and I would advise you go for the Watford DFS as you get some useful extra commands like formatting and sector editing.*

Adding a drive

SEVERAL years ago I opted for an AMS 3in dual double-sided drive, taking its power from my BBC Micro. I have always been very satisfied with both its convenience and reliability, but commercial software for the BBC Micro was never very abundant on this format and regretfully has now become almost extinct.

In order to compensate for this I am considering buying a 3.5in single drive and wonder whether it would be possible to add this to my present double dual.

Could the additional drive be permanently wired to my system to be readily accessible from the keyboard with minimum hardware switching?

Also, is the BBC B capable of handling

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Compact

commands to more than my present four disc surfaces and would its power supply accommodate the extra drive?

I would not wish to give up my existing four-drive unit but would dearly like access to commercial software without the need to plug and unplug the hardware. – **D.B. Brown, Ponteland, Northumberland.**

● *The poor old power supply in your BBC Micro could not cope with the extra load. I always recommend a separate power supply for all disc drives.*

Also the operating system and the disc controller chip cannot handle any extra drives. However you could add the extra drive by fitting a single pole changeover switch in the drive select line of the disc cable. All the other lines would be parallel up to the extra drive.

The switch would then send the active low select signal to the original or extra drive. Also place a 3k3 pull-up resistor to 5v on each of the select lines. Then you could select one of your 3in or your new 3.5in drive. Make sure there is only one terminating resistor pack in the drive furthest away from the computer.

When you switch from one drive to the other the disc controller chip will not know where the new head is located. However, this will be automatically taken care of by the operating system.

The first disc access after swapping over will cause a "seek track zero" to be executed and all will be well again.

It is a bit of a fiddly job to do and I wouldn't recommend you to try unless you are fairly confident with electronics.

Timed trouble

I HAVE a 1.2 OS BBC B Micro with issue 4 board fitted with Watford DDFS 1.53. During approximately the first 10 minutes after switch-on any disc access results in a CRC error at 00/02.

During the next 10 minutes the error message "Sector not found at 00/02" is produced, and after 20 minutes or so the system functions correctly. It is the warm-up time of the computer that is critical, not the disc drive.

I have tried fitting alternatives for the 1770 board and ICs 79 and 80, but the fault persists. When the computer is working, I have used freezer spray on IC 27, 33, 77, 87, without inducing the fault. Also slightly flexing the circuit board doesn't produce the fault. – **D. Shore, Pinner, Middx.**

● *You seem to have covered the areas most likely to be at fault. Make sure IC79 and 80 are 7438 and not 74LS38. The 1770 is most likely to be suspect, but as you have changed it for a working one we can rule that out.*

As the freezer spray on the chips had no effect it might just be the capacitor on the input monostable. This is C13, and should be in F.

You could also try the spray on the CMOS counter chain IC 83, 84, 86 as this could be producing an unsteady output or IC81 or 82 could be the culprit. Basically you want to be looking at any device the data signal passes through.

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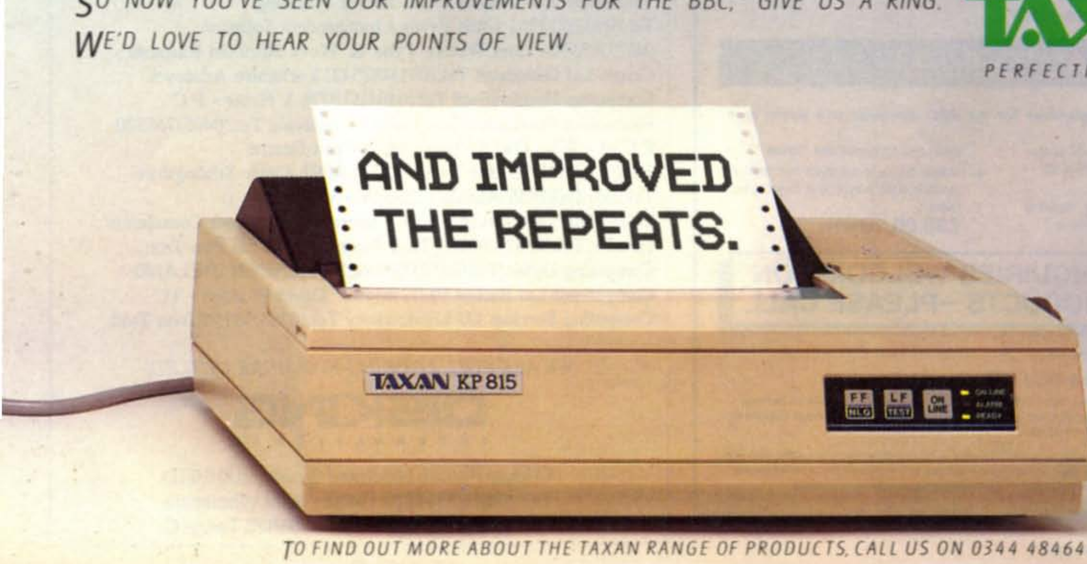

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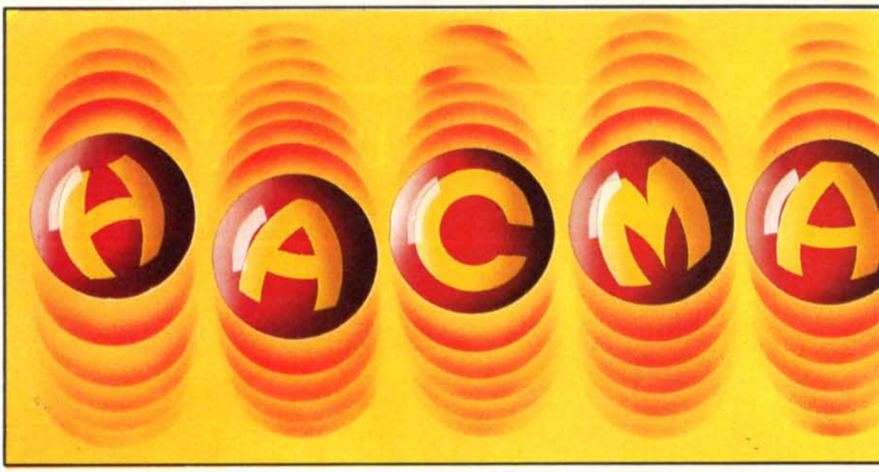


A DISTURBING trend has arisen in the last few months – that of readers copying pokes from other magazines and sending them in as their own. I have received half a dozen letters concerning a method of obtaining the passwords and competition codes in Around the World in Forty Screens, a method first published in another magazine.

Please don't do this – it simply insults your intelligence, our intelligence and, most especially, the original author of the poke.

In the case of the Around The World cheat, using the poke gives the wrong competition entry code anyway, so what's the point?

Surely there are enough top quality games on the market for everyone to do something different? This column has always featured out-of-the-ordinary pokes – redefined keys and personalised high score tables spring readily to mind – as well as the more common infinite lives. That said, on with the show.

I have received a number of letters in response to my July column about Master compatibility. I have since discovered, thanks to Tony Sothcott and Orlando, another frequently used programming technique that renders games inoperable on the Master.

In all display modes, a 64-byte row multiplication table – located in the OS rom – is used to identify how the screen is mapped out in memory.

On the model B the vector at &E0, the contents of zero page addresses &E0 and &E1, points to the address of this table. On the Master, however, the &E0 vector has a different function, so any game that uses this vector directly, such as Orlando's Frak!, will not produce a correct screen display.

Some other games, such as Bug Eyes and Tony's Castle Quest, read the table directly from the rom, starting at memory location &C375 in OS1.20.

On the Master, this area of memory is private filing system workspace, so locations &C375 to &C3B5 are normally zeros. Once again, this means that the screen display is not properly set up.

The effect of either of these techniques is that the game will run, but all screen output is squashed into one screen row. This does, of course, make it a little difficult to work out what's going on. The answer to this problem is to set up our own row multiplication table at &C375 in the Master's private ram.

This method also works with games loaded from disc, but because the table is located in filing system workspace, it must be set up after the last disc access has occurred, or it will be overwritten. This is the technique I have used for Chrysalis *(see panel left)*.

On the general subject of compatibility, the aspect most often discussed is that of compatibility between different BBC Micro operating systems. This is, however, by no means the only problem. In the early(ish) days of the BBC Micro, a variety of independent double-density disc interfaces were introduced as an alternative to the Acorn DFS with its 8271 floppy disc controller (FDC).

With the ADFS system just a twinkle in Acorn's eye, and the availability of the 8271 on a par with hen's teeth, such interfaces, based on other FDCs, seemed an excellent way of adding a disc drive to the cassette-based BBC Micro.

The problems came when buying disc-based software for the newly expanded machine. Many protection systems, particularly those used on commercial games, were designed to control the 8271 directly. This meant, of course, that no other FDC would work.

Another problem was that the DFS software supplied with some of these interfaces did not correctly emulate many of the intricacies of osword &7F, a call introduced by Acorn to handle reading and writing to a floppy disc. Unfortunately there is almost nothing that can be done about this.

Now on to the hints. Toby Gill has

Master Chrysalis conversion

To demonstrate the technique of creating the multiplication look-up table in the Master I have chosen the Icon/Audiogenic title ***Chrysalis****. To start, enter Listing I and *SPOOL it to your own blank tape as CHRYSPL, as for the Jet Set Willy II (March 1987) and Snapper (August 1987) routines. Then insert the Chrysalis tape and type:*

```
PAGE=&4000
LOAD"CHRS1"
```

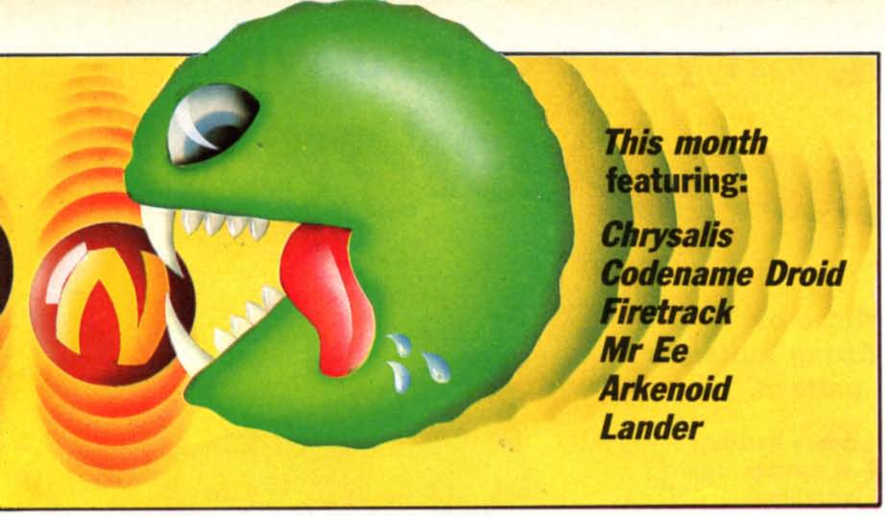
When that file has loaded, *EXEC CHRYSPL back into memory and type:

```
RUN
```

Chrysalis will now work, with the screen set up correctly. The programmers among you will recognise that lines 140 and 150 contain a fix to redirect a jump to the correct address in the OS rom, in this case the primary interrupt vector IRQ1V. (I don't know, two illegal techniques in one game...) Lines 160 to 180 set up the vector table; they can be used without modification for other games which read the row multiplication table directly from the rom.

```
   60 REM Chrysalis to Master converter
   70 REM by Hac-Man 1987
   80 REM (C) The Micro User
   90 *LOAD CHRS2
  100 PROCconvert
  110 CALL &1B00
  120 END
  130 DEFPROCconvert
  140 Z%=!&FFB7 AND &FFFF: REM read addr
ess of vector table
  150 ?&2402=Z%?4:?&2407=Z%?5: REM redir
ect direct rom call
  160 ?&FE34=&18: REM set ACCCON to allo
w write into private ram
  170 FOR I%=0 TO 31:J%=I%*640:P%=(2*I%)
+&C375
  180 [OPT 2:EQUB J% DIV 256:EQUB (J% AN
D 255):]:NEXT
  190 ENDPROC
```

Listing I: Chrysalis to Master converter



This month featuring:

Chrysalis
Codename Droid
Firetrack
Mr Ee
Arkenoid
Lander

identified a peculiarity in Superior's Grand Prix Construction Set. When you and your opponent go over a hump-backed bridge together at speeds greater than 180 mph, the first car will explode but the second will fly into the air, land and carry on racing.

Toby also suggests that at the start of the race you should try to push your opponent into the striped edge of the track. This will cause him to slow down, allowing you to take the lead. That's not very gentlemanly!

Graham Keith of Rossendale has news of a hidden maze in XOR. On the main menu, select the *play game* option. Instead of choosing one of the proffered mazes, press Control+Q. The new maze – appropriately named The Hidden Cavern – will now load.

Following the list of passwords for Imogen published in the October issue, William Shalcross and Jon Ewing have written in to say that the game also has a few undocumented passwords. First, select the Question Mark icon then enter the password DEBUG-MODE. The control panel turns purple and you now have access to the extra passwords.

Enter GIMME to instantly collect all 16 parts of the spell, EPILOGUE to see what happens when you complete the game, or DUMP to copy the screen to an Epson-compatible printer. Enter the password NORMAL-MODE to return the game to normal. Imogen also recognises the passwords REVIEW-MODE and TEST-MODE, but these do not appear to do anything. Of course, I stand ready to be corrected.

Every so often a new game appears that stops everything in its tracks. One such was Fortress, a diagonally-scrolling Zaxxon clone that revolutionised game programming. The BBC Micro was one of the few machines on which an official

Turn to Page 55 ▶

Droid/Opus compatibility

In the October issue of The Micro User I featured a routine that allows Imogen to work with the Opus Challenger system, so I was very pleased to receive another, from Mrs E.Powney of Bristol.

Mrs Powney has an Opus DDOS disc interface fitted to her machine, and has found the recently released Superior title ***Codename Droid*** *to be incompatible. She offers the following routine as a solution to the problem:*

```
*KEY9 1080CALL&A00|MPROCLOAD|M
*LOAD STRYKER
?&A04=&BE
?&A0B=&C8
?&A10=&45
?&AC5=&12
?&A0E=&20
!&A5D=&C90AC5AD
!&A61=&EE0EF01B
!&A65=&C0AD0AC5
!&A69=&8D0A690A
!&A6D=&564C0AC0
!&A71=&77004C0A
LOAD"LOADER"
GOTO 40
```

When you are asked whether you want to view Stryker's controls or load the game press Escape, then f9. The rest of the game will now load. Many thanks to Mrs Powney for this tip; I am sure it will be of use to many readers as well as generating a few more sales of the game to DDOS owners. By the way Droid's predecessor, ***Stryker's Run****, works without modification.*

FireTrack revisited

Regular readers will recall details of a cheat facility built into the Electric Dreams game ***FireTrack****. Orlando has since told me that there is also an extended version of that cheat.*

If you hold down Shift-Lock and Copy as well as f9 and f0, f9 will be programmed to jump to the last level as before but now with 42 lives. Why 42? "Why not – it's had a good press...".

Orlando has also shown me some of the background details featured in the game, which I had previously taken for granted. Pause the game and look closely at the background. You'll see such features as a Pac-Man being chased by a ghost, and the recurring 42 in the guise of a command post.

Ee enhancements

Catherine McLaren has been playing ***Mr Ee*** *non-stop ever since it was released, and would like to know if there will be a BBC Micro conversion of Mr Do's Castle, the follow-up to the arcade original, Mr Do. Unfortunately, Catherine, not that I know of, although I'd certainly welcome it myself. How about it, Micro Power?*

We cannot let a game as good as Mr Ee escape without receiving a quick bit of the Hac-Man treatment, so here goes. Start off by typing:

```
*LOAD MREE
```

Followed by:

```
!&1ECF=&031001A9
```

For infinite lives. To enable the game's defined characters to be correctly displayed on the Master, enter:

```
VDU 23,224,195,102,60,24,60,102,195,
129
VDU 23,225,15,30,60,120,240,225,195,
135
VDU 23,226,0,126,126,126,0,231,231,2
31
VDU 23,227,96,240,249,255,159,15,6,0
```

before running the game.

M.Eastmond of Amersham, Bucks has a useful tip for ***Mr Wiz****, Superior's (inferior) version of Mr Do. Hold down the spacebar and Escape on any level to jump to the next screen.*

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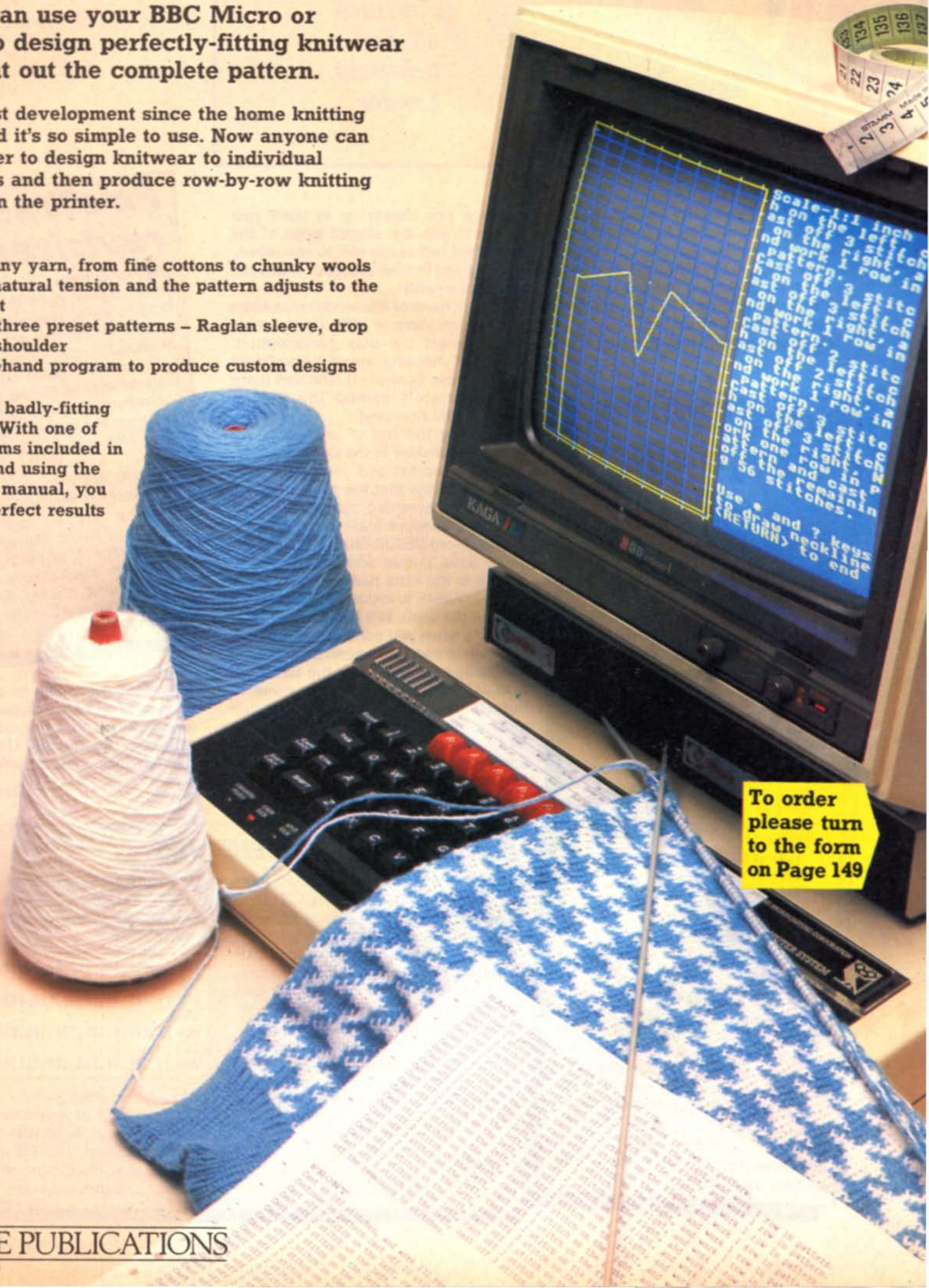

The program itself produces a plain knit, leaving you to use your own favourite stitch pattern, such as the Fair Isle design featured here.

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DATABASE PUBLICATIONS

```
   10 REM > CHEAT
   20 REM by Andy Smith
   30 REM (c) The Micro User
   40 IF PAGE<>&13000 THEN PAGE=&13000:C
HAIN"CHEAT"
   50 DIM code% 1024
   60 *LOAD GAME.GAMECODE 8700
   70 lives=FNhow("many lives",1,1000)
   80 gravlevel=FNhow("much gravity",0,&
90000)
   90 IF gravlevel=0 gravlevel=&30000
  100 lifeloc=&A6B0:gravloc=&A6B4
  110 PROCassemble:CALL code%:END
  120 DEFPROCassemble
  130 cmp=4:REM R4 for comparison
  140 src=2:REM R2 holds src address
  150 dst=1:REM R1 holds dest address
  160 FOR pass%=0 TO 2 STEP 2:P%=code%
  170 [OPT pass%
  180  LDR src,start ; relocate lander
  190  LDR dst,dest  ; to it's original
  200  LDR cmp,end   ; position
  210 .moveloop
  220  LDR 3,[src,#4]! ;Relocate the
  230  STR 3,[dst,#4]! ;code to proper
  240  CMP src,cmp ;position
  250  BLT moveloop
  260  LDR 1,l   ;Then sets up
  270  LDR 0,n   ;new storage areas
  280  STR 0,[1,#0]  ;for number of
  290  LDR 1,g   ;lives and gravity
  300  LDR 0,gl:STR 0,[1,#0]
  310  BL &A614  ;Jumps to game
  320  ADR 0,cmd ;Back to Basic after
  330  SWI &5      ;if possible
  340 .dest EQUD &8000-4
  350 .start EQUD &8700-4
  360 .size EQUD &9A10
  370 .end EQUD (&8000+&9A10)
  380 .l EQUD lifeloc
  390 .n EQUD lives
  400 .g EQUD gravloc
  410 .gl EQUD gravlevel
  420 .cmd EQUS "BASIC":EQUD0:ALIGN
  430  ]:O%=&A764:P%=(&A764+&700)
  440 [OPTpass%:LDR 0,(&A6B4+&700)
  450   ;Changes "MOV R0,#n" to
  460   ;initialise gravity from
  470   ;new gravity storage area.
  480  ]:O%=&A76C:P%=(&A76C+&700)
  490  [OPTpass%:LDR 0,(&A6B0+&700)
  500   ;Changes "MOV R0,#n" to
  510   ;initialise lives from
  520   ;new life storage area.
  530  ]:IF pass%=0 THEN
  540   bradd=&A6BC:P%=&A690:O%=&AD90
  550  ELSE
  560   bradd=&A724:P%=&A6F8:O%=&ADF8
  570  ENDIF
  580  [OPT pass%+4
  590  EQUS"Modified Lander. The Micro U
ser":EQUB0:ALIGN
  600   ;New title is shorter as
  610   ;some is used for new storage
  620  ]
  630 IF pass%=0 THEN
  640  [:OPT4:B &A6BC:]
  650 ELSE
  660  [:OPT7:B &A724:]
  670 ENDIF:NEXT:ENDPROC
  680 DEF FNhow(q$,lo%,hi%):LOCAL a%
  690 REPEAT PRINT"How "q$" would you li
ke";
  700 INPUTa%:IF a%<lo% OR a%>hi% THEN
  710  PRINT"Minimum is "lo%
  720  PRINT"Maximum is "hi%
  730 ENDIF:UNTILa%>=lo%ANDa%<=hi%:=a%
```

Get it right!

```
 10 =    0 0 | 260 = 442E 0 | 510 = 1FB2 3
 20 =    0 0 | 270 = 97DF 7 | 520 = 8B30 F
 30 =    0 0 | 280 = A9DD A | 530 = 2F13 A
 40 = 150B B | 290 = D88A E | 540 = 4E5C C
 50 = DCF9 C | 300 = 26F2 B | 550 = 18C0 1
 60 = DB44 5 | 310 = 516B D | 560 = D33B B
 70 = 1B0E 4 | 320 = B7A2 9 | 570 =  8E1 8
 80 = C26C A | 330 = A648 0 | 580 = 4334 6
 90 = 7378 9 | 340 = D3D8 6 | 590 = C4D2 0
100 = C91B 3 | 350 = 683E B | 600 = 24A9 8
110 =  806 2 | 360 = 911A D | 610 = 6E20 3
120 = 98E9 D | 370 = DF7D 9 | 620 = 8B58 8
130 = 3297 3 | 380 =  990 0 | 630 = 6C51 D
140 = 636D 9 | 390 = B512 0 | 640 =  611 4
150 =  420 6 | 400 = 1AFE 2 | 650 = 18C0 C
160 = 87CC 8 | 410 = 69CE F | 660 = CB57 1
170 = 95CD C | 420 = 672C A | 670 = B3B1 4
180 = 5B41 7 | 430 = CD27 7 | 680 = 2C93 A
190 =  A17 5 | 440 = 5634 2 | 690 = 964B 5
200 = 570D F | 450 = 5679 0 | 700 = 4F82 E
210 =   6B 3 | 460 = C0E9 4 | 710 = BF1D 1
220 = A33A D | 470 = D824 D | 720 = BBCF B
230 = 7450 9 | 480 = 78AB 6 | 730 = C732 6
240 = 4BA4 D | 490 = 97F2 F |
250 = 5413 E | 500 = 5679 2 |
```

Listing II: Lander Cheat program

◀ **From Page 53**

version of Zaxxon never appeared. I am sure that Fortress was the main reason for this.

It is now over three years since Fortress rocked the BBC Micro world, but I am pleased to announce that Matthew Newman, the game's author, has just given me a preview of his new game.

This latest offering is based loosely on the arcade favourite Marble Madness and is provisionally entitled Nec Pluribus Impar. Mat tells me that it was the motto of a German king and translates as "Better than all the rest". Certainly, on first impressions it looks well worth the wait. Watch this space...

Not to be outdone (by anyone) those of you with an Archimedes will find Listing II very useful for playing Lander. It can give you infinite lives (or whatever number you want) plus control of the starting gravity level, but it doesn't stop the doubling of the gravity at 1023 points. And – unlike the boulders which stop dropping if you reduce your score below 800 – once the gravity is increased that's it. Outside of cheat mode the best score I've heard of so far on Lander is 1111.

When you've typed the program into your Archimedes save it then check for typing errors using the checksums (using the 6502 emulator). When you run the program (not in the emulator) you can select the number of lives and the gravity level. Don't input zero but a value like 1000 gives a gentle down thrust and hours of fun.

Once again, we seem to have run out of space. Many thanks to all of you for the great tips over the year. Happy Christmas!

Arkanoid deciphered

*Master owners will have found that the introductory text in the Basic loader of **Arkanoid** displays strange characters. This is easily corrected: Simply LOAD"ARKANOID", then type !(PAGE+&8A)=&3A383231 followed by RUN.*

As a brief interlude, Neil Johnson has written in from Colchester with a useful tip to make the game much easier.

Many games, Arkanoid included, feature a pause facility, in which pressing one key (normally Copy) freezes the game and another (normally Delete) restarts it. If while playing Arkanoid you hold these two keys down, the game will be continually stopping and starting, and thus moving at a greatly reduced pace.

This technique can also be taken one stage further. When playing the game normally, hold the Shift key down to speed up the movement of the Vaus. If you hold Shift down as well as Copy and Delete, you will find that the Vaus moves at its normal speed but the rest of the game moves much more slowly.

Neil says that he has managed to get to level 9 using this method. As I have only ever reached level 3 myself, I can't wait to try it.

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by
The
Mad
Hatter
10/6

Parsers that make or break a game

I HAVE been examining Adventuresoft's Temple of Terror and comparing it with the Robico-badged (improved) reissue of Village of Lost Souls. I have compared the pedestrian with the exciting, the dull with the innovative, the engaging against the hackneyed.

I'll do my best to illustrate what I mean, though I don't want to utterly denigrate Temple of Terror – it's still playable, though at a lower price than charged (cassette £7.99).

This illustrates the subjective nature of reviews. One game may tickle my fancy and another not, simply on account of what I can only describe as the general ambience of the adventure in question.

Temple of Terror is typical of games from the Adventuresoft stable – a workmanlike and, in some ways, ingenious offering well stocked with interesting puzzles.

The useful command BOM (back one move) is added to retrieve life and health, though it cannot be used indefinitely in the same circumstances.

I enjoyed the early moves, but then got increasingly irritated. The parser verges on the primitive: I no longer find the need to enter expressions like GO BRIDGE even faintly amusing.

Thus, when I discovered that the only way to open up a hitherto unflagged exit was to enter GO BOULDERS, I consigned the adventure to Division Two along with quilled offerings.

Adventuresoft kindly sent me a hint sheet. However, I encountered a Basilisk whose gaze needs reflecting. I have tried just about every sensible input involving manipulation of the mirror I found, and still I can't deal with that creature.

It is time Adventuresoft's parser became more literate – at the moment it's rather decrepit. Temple of Terror's concept is good, the puzzles look like fun, but the product is spoiled by sloppy and inadequate programming.

The lesser status of such an adventure is clear when, by contrast, you look at one with elegant, long-winded descriptions, intricate and occasionally convoluted puzzles. In an adventure, good prose is essential if the game is to be first class.

The opening description of Temple of Terror is:

> *You are on the banks of the Catfish River which is spanned by a rotting rope bridge. Moored nearby is an ancient sailing boat, the crew of which are shouting and yelling in a drunken and very threatening manner.*

While not bad, it turns out to be the tour de force. More typical is:

> *You are on the deck of an ancient sail boat. You are surrounded by sleeping sailors. You can go east.*

The following two descriptions show clearly the difference between a Division Two (as illustrated above) and a Division One adventure:

> *You look around. You are outside a tumbledown windmill. The mill door hangs listlessly from one rusty hinge. There are visible exits north to a cottage, south to a ring of stones, up to a sail and in to a store room.*

Or:

> *Gazing around you see that you are in the only room of the Miller's cottage. It has been thoroughly ransacked, with only a very unstable truckle bed and a primitive oven apparently left untouched. You can go in the following directions: southeast to a garden and out to a cottage.*

These were chosen at random from the first few location descriptions of Village of Lost Souls. The rest of the adventure is similarly larded with elegant prose thanks to superb text compression.

Village of Lost Souls is not a beginner's choice, but for any reader enjoying good crosswords or other intellectual delights, this is the game for them. The cassette version costs £9.95 and a disc £12.95.

I have been sent a 40 track disc of the reissued version, and it worked perfectly on my loaned Master.

Robico's parser continues to be refined; you can now enter sentences like:

> *Take everything except the sword.*

Robico's revival command is OG (go backwards): You'll find it so useful in embarrassing situations where unfortunately you become slightly dead.

I mentioned in last month's stop press that I had just received a Master compatible version of The Hunt, (Robico's new graphic adventure) and I can confirm that it has extra goodies for Master owners.

You are captain of an intergalactic space craft; Shauna your crew member has been kidnapped, and you are hot on

Turn to Page 58 ▶

Helpline

Paul Hunt needs the tweeds in **Hampstead:** Go to the Oxfam shop, drop tracksuit and wear tweeds.

David Bibby has troubles with **Philosophers Quest** (full solution appearing soon). He's got to the laboratory safely, but lost his possessions: Drop them in the E/W corridor then, when you have created the laboratory, you can safely return for the lamp.

David offers help to John Sanderson in **Gideon's Gamble**. Take a bucket to the farmyard, get water from the well and give it to the crew when needed. Do the same with the rum (if you have the jug and can afford it).

Three folk have written about the **Hobbit** endgame and the murderous pale bulbous eyes: I survived by wearing the ring, but I'd welcome comment from other successful readers.

Another endgame problem: **Colossal Adventure** foils Nicholas Pollard. Drop the dynamite by the dwarves, go SW, SAY BLAST, go back and into the E/W corridor. After that you must keep on the move until water and fire interact and you have firmly shut the door!

◀ *From Page 57*

the heels of the villain when you dock at an enormous space station.

The start echoes Enthar Seven in that you are working against a move counter at first.

However, the solution to the early moves are given in the information sheet and, for those who get utterly stuck, a complete solution is available from Robico.

If you do succumb to temptation, you'll need to exercise monumental self control to avoid going through the game move by move according to the solution.

All the normal features of an excellent adventure game are present with the addition of superbly drawn graphics: They are better even than anything Level 9 produced for the BBC Micro.

I am still a text only fan, but The Hunt has shaken my convictions severely. I particularly liked the elegant and ingenious illustrations for the maze section of the game.

Anyone who enjoyed Enthar Seven or the games in The Silicon Dream trilogy will fall for The Hunt. As an avid reader of science fiction, I found the adventure delightful. The Hunt costs £9.95 for a cassette version and £12.95 in disc format. It looks like being adventure of the year for BBC Micro owners.

That's it on the releases, here's the final part of the solution to Emerald Isle.

Module 7: Take the bowl and INVERT BOWL, take the lamp and get in canoe and go N from the middle of the beach. It's time for some diving experience, so go down, but not before you have entered the following instructions: TAKE ANCHOR, DROP ANCHOR. Anything else and the canoe will drift away and be lost.

The inverted bowl will keep the lamp alight under water enabling you to see and take the sapphire and the sword from the sunken wreck.

Deposit these treasures on the beach and then make sure you are wearing the armband. Take the book, the post and the identity card to sparse shrubs, go past the logger to gravestones and read the plaque on the monument.

Insert the post into the hole, enter the carved chamber and move the carvings.

Get the long rope from the bare chamber then insert the identity card into the slot so that you can enter the control centre. Pull the lever to free the traffic jam, go back to the beach, drop everything and save as usual.

Module 8: Make sure you are wearing the overalls and spikes. Take the lamp, the pliers and the screwdriver then get in the canoe and go to the blowhole once more.

Visit the city and locate the elevator. Examine the controls, examine the plate, release the plate, look, mend the wires and push the button to operate the elevator.

Visit the office as instructed by the voice in the control centre, get the gems and go back down to ground level.

Find your way to the airport, board the plane and find the brooch. Return to the beach and save once again.

Module 9: Life gets complicated here: It's a final tidying up session. First make sure you have digging equipment, the lamp and the spikes and the long rope. Get in the canoe, cross the sea to the shady cove and go up to the desert area.

Problem Corner

The mathematical adventure L by ATM has been mentioned before: Where can Susan Birchnall obtain it, please?

Find the scree and the mountainside. Go up and in to the riven rocks, then down the shaft to the lava chamber and dig for the diamonds. Take them back to the beach.

Collect the long rope, the book and the boathook, wear the robe and go to the station. Take the train to the village, cross the jungle river and go to the temple. Stand on the block and THROW ROPE over the statue's arm. PULL ROPE to move the slab and go into the granite grotto.

Read everything you see. Throw the robe to trigger the spear, then drop everything except the lamp while you go back for the block. Take the block to the ornate entrance and drop it before attempting to enter the tiny tunnel.

Go and collect everything you dropped, including the long rope. Enter the low crawl and push the ceiling with the boathook so that you can go down into the greasy grotto for the idol.

Back you go to the beach for almost the last time. Leave the treasures here, but make sure you keep the lamp, the long rope, and take the digging equipment. Into the cave for the very last time and go to the river valley, crossing the ladder to the hill slopes. Go to the pinnacles, remove the short rope and attach the long rope.

Down to the smallest cave, make your way to the grotty grotto and dig your way down to the cosy cave, get the ruby and move W directly to the middle of the beach!

Hall of Fame

Congratulations to *Barry Sims* and *Nicholas Gutteridge* for the first complete solution to Greedy Dwarf; also to *Richard Entwistle* for an elegant logical map to **The Price of Magik**. And thanks to *Paul Hunt* for the solution to **Circus.**

Endgame: At this stage, you should have 19 out of the 20 treasures. These are: Map, sapphire, sword, coronet, necklace, robe, gold nugget, coconut, painting, chest, gems, idol, opal, platinum pyramid, brooch, dubloons, figurine, diamonds and finally the ruby.

These should all have been deposited at the middle of the beach. Wear the robe now, rather than the overalls, and don't undress till I tell you!

Gather up as many treasures as you can carry, less one (you need the season ticket), and travel to the palace and deposit them upstairs in the Treasure Chamber.

Go back for the rest and then pick up the ornate key on your way back to the palace. Drop all the treasures except the idol and the robe.

Go to the city square and open the gate with the key. Visit the museum, drop the idol to get the silver, take the idol again and return to the treasure chamber. This time you can drop everything, including the robe.

The posh butler will come when you pull the bell rope, and he calls a guard. As you have explored the adventure, you will have seen six different capital letters in various places.

These together will form the password needed to satisfy the guard and so get you past the barrier into the beautiful room and out of the game with the plaudits of Level 9 ringing in your ears.

See you next month. Until then, happy adventuring.

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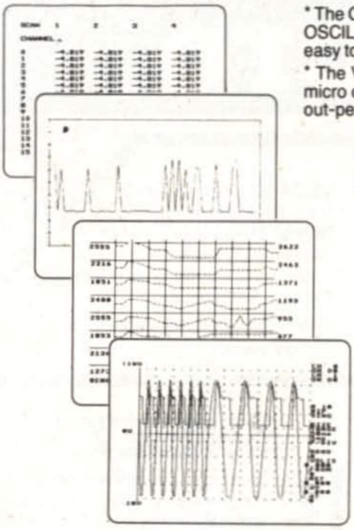

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MEGA-ROM is compatible with the entire range of BBC Micros, Model-B, B+, B+128, Master and Master Compact. A version will shortly be available for the new Archimedes.

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A comprehensive chart and graph plotting package. Data can be entered directly at the keyboard, transferred from INTER-SHEET, INTER-WORD or INTER-BASE, or read from file. This data may then be displayed in a variety of graphical forms, edited, printed, saved, etc.

Features include:

- **Up to 16 graphs in each INTER-CHART package**
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The fastest spreadsheet available for the BBC Micro, suitable for home or business use—anything from calculating the home budget to financial forecasting.

INTER-SHEET is driven by prompts and provides a full 'help' list. Some of its main features include:

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SPELL-MASTER

128K

A totally ROM-based spelling checker for use in conjunction with INTER-WORD. This allows checking of the entire text, just a marked section of the text, an individual word, instant checking as-you-type, browsing through the dictionary, etc.

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This is a 64K ROM, occupying just one socket. Compatible with the entire BBC Micro range (not compatible with the Archimedes).

Price: £60.00 +VAT (£69.00 incl.)

Feeding your Archimedes

Andy Smith finds 65Arthur a real boon

THERE is a price to pay for being the owner of a computer based on leading-edge technology like the Archimedes – and that is lack of software. Whenever a new computer is released there is always a pause until software companies design and produce programs to take advantage of it.

This can be frustrating, as it can take months before a good word processor or spreadsheet is available, leaving you twiddling your thumbs or attempting to write your own. Fortunately for Archimedes users salvation lies in 65Arthur.

This useful routine is on the Welcome disc supplied with the micro and is an emulator for 6502 machine code programs to let you run them on the Archimedes. So good an emulator is it, that it will give you an environment identical to a 6502 second processor and still run at the speed of a BBC Micro (approximately 2MHz).

This means that any program that runs according to the rules will run under 65Arthur. The program must not poke screen memory, access any hardware directly, contain interrupt routines, or make assumptions regarding memory (for example where character definitions are stored).

This list is not exhaustive and seasoned BBC Micro owners could probably add to it. Unfortunately this counts against the vast majority of games.

Restrictions apart, 65Arthur certainly helps the current software famine by enabling the vast majority of languages and applications to run. Among those that can be used are View, Viewsheet, Viewstore (rom only), Acornsoft C, Master Basic Editor, ISO Pascal, Logo, Inter family (roms only), Hi-Basic, Exmon, Exmon II, Ultracalc and many others.

When the Acorn rom podule becomes available this should give even greater choice. Any rom images used must be languages or applications – any roms that have a multitude of star commands like Disc Doctor, Print Master or ADT are not suitable.

So how can languages be used on 65Arthur? First you require a rom image of the program on 3.5in disc in ADFS format and you can purchase versions of many languages on disc already. Viewsheet for the Master Compact will run, and the Compact Welcome disc has images of View (complete with printer drivers) and Logo which will both run.

The 65Arthur is a relocatable module in the Modules directory, which loads into the RMA (Relocatable Module Area) on an Archimedes using the command:

```
*&.MODULES.65ARTHUR
```

If you get a message to the effect: No room in RMA (more common on 512k machine), then increase the RMA size using:

```
*CONFIGURE RMASIZE n
```

where *n* is the number of 32k pages of memory you require for modules. Then press Control+Break.

```
*STATUS RMASIZE
```

will tell you the current value. The 65Arthur module will load in and run automatically, giving you a message like:

```
6502 Emulator 0.82 (01 Jun 1987)
Acorn 6502 TOS 0.40 (11 Jun 1987)
BASIC
```

TOS stands for Tube Operating System, which intercepts any calls. For instance *BASIC gives you 6502 Basic and not ARM Basic and osbyte 234 (&EA) will return indicating an active Tube allowing some languages to relocate themselves (View 3 and Ultracalc 2 for example).

The Basic included with 65Arthur is almost identical to the Master 128 Basic IV. Indeed the command EDIT is implemented and if an image of the Basic Editor is found on a disc it will run as normal. Any 6502 and 6512 machine code programs can be written using the standard built-in assembler and machine code programs that adhere to the rules can be used.

A disassembly of the Basic interpreter included with 65Arthur reveals that it is written entirely in 6502 code, although I am curious as to why it is not a Hi version, even though Hi-Basic from the Turbo utilities disc will run. 65Arthur Basic includes an intriguing message at address &BF03. Use this small program to see it:

```
10 REM 65Arthur Message
20 FOR A%=0 TO 35
30 VDU A%?&BF03:NEXT
40 PRINT:END
```

To use a language you must ensure that its load address is correct, that is &8000 for non-Hi versions and &B800 for Hi versions. You must *RUN the module, as *LOAD does not pass control to the new program, and the Emulator gets very confused if you overwrite Basic

Turn to Page 62 ▶

It's the Micro of the Year

THE Acorn Archimedes 300 series has won the coveted Micro of the Year Award. "A lovely little bit of technology", was how the machine was described as the 1987 British Microcomputing Awards were announced.

The judges' citation said that the Archimedes was a clear winner because of its chipset and the possibilities it opened up for the future.

Accepting the award, Acorn sales director Dr Bernhard Steiner said: "The prime consideration was that the machine should be technologically innovatory and offer a way to the future.

"And there is no doubt that the Archimedes matches this consideration very well.

"We announced the product in June and over the summmer we shipped many machines for evaluation purposes. Without exception, the response was highly enthusiastic.

"We know of many software packages that now run on the Archimedes and every day we hear of new ones which will become available during the next few months.

"With the addition of an MSdos capability to the range, and the access to popular business packages that this gives, we fully concur with the judges that the Archimedes 300 series is the small business and home computer of the year", said Dr Steiner.

◀ *From Page 61*

without asking. So, for example, to run an image from the currently selected disc you have the following choice:

***name**	If load address is &8000.
***name 8000**	If not correct address (or not known), use B800 for Hi versions.
***/name**	If *name is a command that might be recognised by the operating system (for example *EDIT).

The memory map is identical to that of a 6502 second processor and is limited to the 6502 address range of 65536 bytes (64k), with oshwm at &0400, PAGE at &0800 and HIMEM at &8000 (or &B800 for Hi version).

All VDUs are passed through to Arthur, the Archimedes operating system. This means that it is possible to use all the available screen modes from 0 to 17 and the full range of colours. Any memory accessed is equated to the pseudo-addresses of the emulator, therefore only 16-bit addresses are significant. This means that:

```
*LOAD name 00008000
```

is identical to:

```
*LOAD name FFFF8000
```

and will not try to load into the I/O processor as it would on a BBC Micro/6502 Tube system.

The only let down in this excellent emulation is the failure to implement any of the old BBC Micro sound facilities via the ENVELOPE command or osword 8 (ignored so no error occurs). Presumably this is due to the radical difference in the sound system between BBC Micro and Archimedes.

The keyboard is of course very different, mostly re-arranged with the extra number pad and word processor block. All the function keys are there, but remember that f0 is now moved to the top right and renamed Print.

It is possible to leave 65Arthur temporarily with *GOS. This gives you the Arthur supervisor and stops the emulator in its tracks. But this is only a pause and *QUIT will take you back to 65Arthur where you left off, program or text retained as this short program will illustrate.

You can leave the emulator by *QUIT which will take you back to the real Arthur. The 65Arthur module is however still loaded and shows up on *MODULES as *BBC6502Emulator*.

```
   10 REM 65Arthur Paused
   20 MODE 12
   30 PRINTTAB(0,10)"Mary
 had a little lamb....."
   40 PRINT'"Program is n
ow paused, use (almost) a
ny * command"
   50 PRINT '"and type QUI
T when you want to return
 to 65Arthur."
   60 *GOS
   70 PRINT'"...Its fleec
e was white as snow."
   80 END
```

You can run it again by the command:

```
*EmulateBBC
```

The inclusion of a good BBC Micro 6502 emulator with the Archimedes was a smart, and probably essential, move on Acorn's part and gives the world's fastest micro a solid background of available software until more custom written packages really show what can be achieved.

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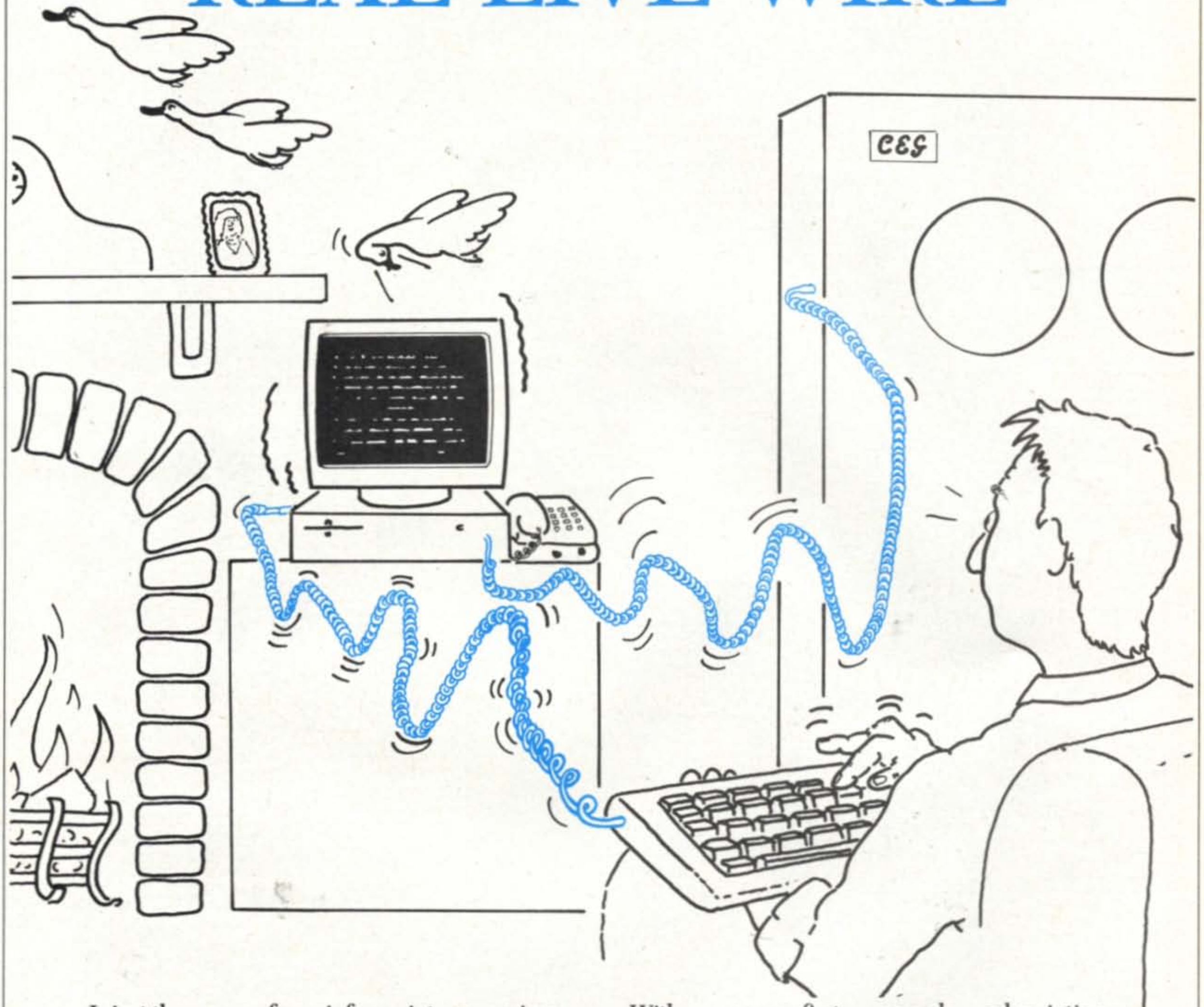

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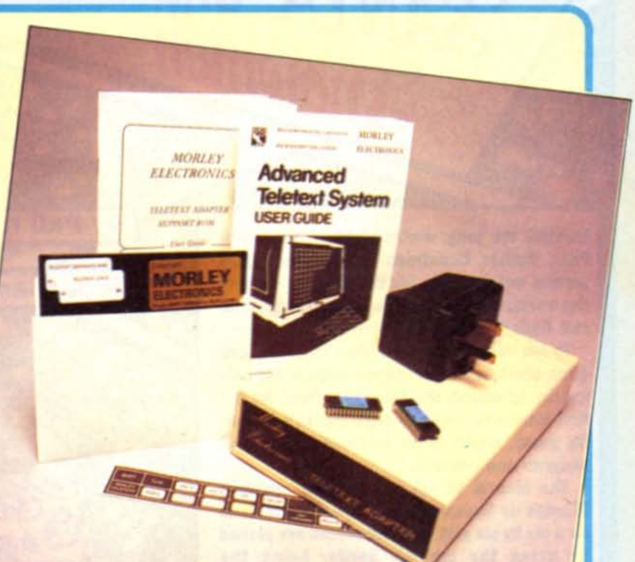

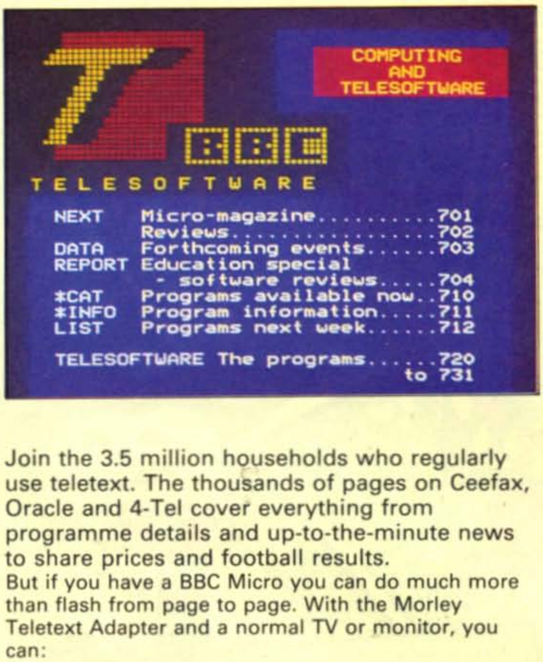

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They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service on 01-927 5040.

TO ORDER TURN TO THE FORM ON PAGE 149

SANTA and the Snowmen

By Pali Rao and Jonathan Perry

DURING the long winter night at the North Pole, Father Christmas is kept very busy sorting out presents for the children all over the world. But despite this mammoth task, he still finds time to enjoy himself.

In his rest periods he likes to relax, and often plays computer games against his only worthy opponent, the Snowman. Now, for the first time ever, you can enjoy Santa's favourite game, which is an advanced version of noughts and crosses.

The idea is to get four of your counters (Santas or Snowmen) in a row. This is done on a six by six grid, and the pieces are placed by using the cursor. Santa, being the sportsman that he is, always lets the Snowman go first.

The main difference between this and standard noughts and crosses lies in the fact that you are able to swap any group of four squares with another group. This gives you extra chances to win by moving blocks of squares. But Snowman beware! If you create a winning line for Santa at the same as your own he always wins.

The players take it in turns to either position a piece or to swap a set of four squares. The player to go next is shown by the character currently displayed in the box at the side of the screen.

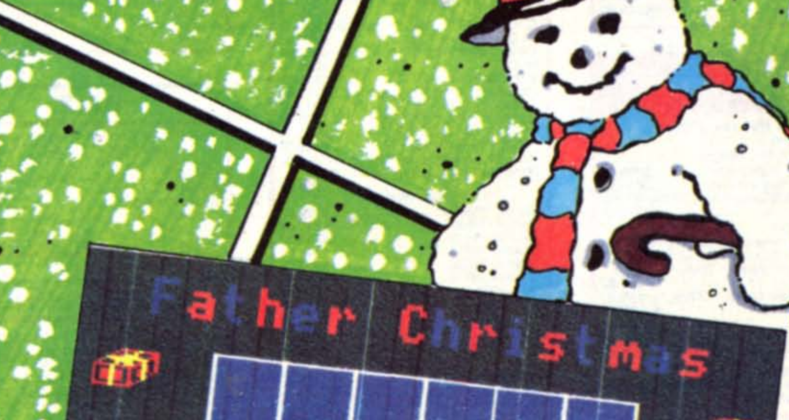
	KEYS:
Cursor keys	Moves cursor
C	Change cursor size
S	Store block to swap and confirm new position after move
Space	Position piece

MAIN VARIABLES

X,Y	Coordinates of cursor
OX,OY	Old coordinates of cursor
XC,YC	Graphics coordinates of cursor
MX,MY	Coordinates of 2x2 segments
CH	Flag for cursor size
S,SI	Size of cursor
LM	Limit of movement of cursor
PL	Player (0=player1, 1=player2)
A$()	Various characters
G()	Grid
P()	Coordinates of 2x2 segment to be swapped

MAIN PROCEDURES

init	Initialises variables and characters
screen	Sets up screen
mv	Checks for keys
cu	Calculates cursor coordinates
pr	Draws cursor on screen
swap	Swaps 2x2 segments of grid
posn	Checks for validity of position
check	Checks for four in a row
size	Changes between small/large cursor
mark	Identifies 2x2 segments to be swapped
w	Signifies a win
db	Prints Mode 2 double height characters
pc	Prints characters
sd	Sound effects
pl	Flashes current players character
ag	Gives players option to replay



```
   10 REM SANTA AND THE SNOWMAN
   20 REM   by Jonathan Perry
   30 REM     and Pali Rao
   40 REM    (c) Micro User
   50 REM **********************
   60 PROCreloc(&1100)
   70 ONERROR MODE7:REPORT:PRINT" at lin
e ";ERL:END
   80 MODE2:PROCinit
   90 VDU5,23;8202;0;0;0;
  100 PROCscreen
  110 REPEATPROCmv:UNTILw>0:PROCw(w):IFF
Nag RUN ELSE MODE7:END
  120 DEFPROCinit
  130 w=0:X=0:Y=0:OX=262:OY=116:T=0:C=0:
CH=FALSE:LM=5:S=128:A=0:PL=0:SI=1
  140 DIMG(5,5),A(3,1),P(1,1)
  150 DIMA$(6),d 10
  160 VDU23,224,127,127,127,127,127,127,
127,127,23,225,255,255,255,255,255,255,2
55,255
  170 VDU23,226,3,3,7,8,0,1,1,1,23,227,1
28,128,192,32,0,0,0,0
  180 VDU23,228,0,0,0,7,5,6,6,2,23,229,0
,0,0,192,64,192,192,128
  190 VDU23,230,3,15,31,30,63,55,54,59,2
3,231,128,224,240,240,248,216,216,184
  200 VDU23,232,59,26,19,15,14,15,7,7,23
,233,184,176,144,224,224,224,192,192
  210 VDU23,234,3,7,15,30,13,1,1,0,23,23
5,128,128,0,192,160,224,0,0
  220 VDU23,236,1,3,3,3,3,3,2,1,23,237,1
28,128,192,232,248,232,248,8
  230 VDU23,238,1,3,3,7,6,2,0,0,23,239,2
40,240,176,56,24,8,0,0,0
  240 VDU23,240,0,0,0,1,50,52,0,2,23,241
,0,64,192,0,64,0,192,224
  250 VDU23,242,30,60,60,124,124,124,120
,112,23,243,112,112,48,16,0,16,0,64
  260 VDU23,244,112,32,0,0,0,5,7,7,23,24
5,0,0,0,0,0,20,28,158
  270 VDU23,246,0,1,2,5,0,20,32,123,23,2
47,0,239,3,23,5,17,53,229
  280 VDU23,248,64,91,91,91,91,64,123,0,
23,249,85,82,84,64,80,96,192,0
  290 VDU23,250,0,0,0,0,15,3,2,4,23,251,
0,16,32,224,248,200,200,8
  300 VDU23,252,4,4,4,4,4,4,4,0,23,253,8
,8,8,8,0,0,0,0
  310 a$=CHR$8+CHR$8+CHR$10
  320 A$(0)=CHR$224+CHR$225+a$+CHR$224+C
HR$225+a$+CHR$224+CHR$225
  330 A$(1)=CHR$226+CHR$227
  340 A$(2)=CHR$234+CHR$235+a$+CHR$236+C
HR$237+a$+CHR$238+CHR$239
  350 A$(3)=CHR$228+CHR$229+a$+CHR$230+C
HR$231+a$+CHR$232+CHR$233
  360 A$(4)=CHR$240+CHR$241+a$+CHR$242+C
HR$243+a$+CHR$244+CHR$245
  370 A$(5)=CHR$246+CHR$247+a$+CHR$248+C
HR$249
  380 A$(6)=CHR$250+CHR$251+a$+CHR$252+C
HR$253
  390 ENVELOPE1,4,0,0,0,0,0,0,126,-6,-6,
-6,126,0:ENVELOPE2,1,0,0,0,0,0,0,126,-1,
0,-2,126,80
  400 ENVELOPE3,1,0,0,0,0,0,0,5,-1,0,-2,
100,80:ENVELOPE4,1,0,0,0,0,0,0,5,-1,0,-2
,85,70
  410 ENDPROC
  420 DEFPROCscreen
  430 GCOL0,4
  440 MOVE262,116:MOVE1030,116:PLOT85,26
```

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◄ *From Page 67*

```
2,884:PLOT85,1030,884
  450 GCOL0,7
  460 FORG=262TO1030STEP128:MOVEG,116:DR
AWG,884:NEXT
  470 FORH=116TO884STEP128:MOVE262,H:DRA
W1030,H:NEXT
  480 MOVE48,400:DRAW192,400:DRAW192,528
:DRAW48,528:DRAW48,400
  490 MOVE1100,400:DRAW1244,400:DRAW1244
,528:DRAW1100,528:DRAW1100,400
  500 VDU19,8,1;0;19,9,1;0;19,10,7;0;19,
11,7;0;
  510 FORc=1TO4
  520 IFc=1ORc=3cx=64ELSEcx=1116
  530 MOVEcx,512:GCOL 0,7+c:PRINTA$(c):N
EXT
  540 FORI=1TO7
  550 IFI=4 NEXT
  560 Q=I*128-16:GCOL 0,1:MOVE32,Q:PRINT
A$(5):MOVE1120,Q:PRINTA$(5):GCOL 0,3:MOV
E32,Q:PRINTA$(6):MOVE1120,Q:PRINTA$(6):N
EXT
  570 PROCdb("Father Christmas",2,1)
  580 PROCdb("vs The Snowman",3,29)
  590 I=INKEY(50):SOUND1,-10,200,1
  600 PROCpl(0):PROCcu:ENDPROC
  610 DEFPROCmv
  620 IFINKEY-83:IFX<5:IFY<5:IFC=0:PROCs
ize
  630 IFINKEY-26:IFX>0:X=X-1:PROCcu
  640 IFINKEY-122:IFX<LM:X=X+1:PROCcu
  650 IFINKEY-58:IFY<LM:Y=Y+1:PROCcu
  660 IFINKEY-42:IFY>0:Y=Y-1:PROCcu
  670 IFINKEY-82:IFCH:IFC=1:IF(ABS(P(0,0
)-X)>1 OR ABS(4-P(0,1)-Y)>1) C=2:P(1,0)=
X:P(1,1)=4-Y:PROCmark(0,XC,YC)
  680 IFINKEY-82:IFCH:IFC=0 P(0,0)=X:P(0
,1)=4-Y:C=1:PROCmark(0,XC,YC)
  690 IFINKEY-99:IFNOTCH:PROCposn:PROCch
eck
  700 IFC=2 PROCswap:PROCcheck:SI=0:PROC
mark(7,OX,OY):PROCmark(7,262+(P(0,0)*128
),116+((4-P(0,1))*128)):PROCsize:C=0
  710 ENDPROC
  720 DEFPROCcu
  730 XC=262+(X*128):YC=116+(Y*128)
  740 PROCpr(7,OX,OY):PROCpr(1,XC,YC)
  750 OX=XC:OY=YC
  760 ENDPROC
  770 DEFPROCpr(C,XP,YP)
  780 GCOL0,C
  790 MOVEXP+24,YP:DRAWXP,YP:DRAWXP,YP+2
4:MOVEXP+S-24,YP:DRAWXP+S,YP:DRAWXP+S,YP
+24:MOVEXP,YP+S-24:DRAWXP,YP+S:DRAWXP+24
,YP+S:MOVEXP+S,YP+S-24:DRAWXP+S,YP+S:DRA
WXP+S-24,YP+S
  800 ENDPROC
  810 DEFPROCswap
  820 FORA=0TO1:FORB=0TO1
  830 T=G(P(0,0)+A,P(0,1)+B)
  840 G(P(0,0)+A,P(0,1)+B)=G(P(1,0)+A,P(
1,1)+B)
  850 G(P(1,0)+A,P(1,1)+B)=T
  860 VDU5:XT=262+(P(1,0)+A)*128:YT=228+
(5-P(1,1)-B)*128:GCOL 0,4:PROCpc(0,XT,YT
):GCOL 0,T:PROCpc(T,XT,YT)
  870 XT=262+(P(0,0)+A)*128:YT=228+(5-P(
0,1)-B)*128:GCOL 0,4:PROCpc(0,XT,YT)
  880 GCOL0,G(P(0,0)+A,P(0,1)+B):PROCpc(
G(P(0,0)+A,P(0,1)+B),XT,YT)
  890 NEXT:NEXT
```

This listing is included in this month's tape & disc offer. See order form on Page 149.

```
  900 PROCsd(PL):PL=PL EOR1:PROCpl(PL):P
ROCsd(PL):ENDPROC
  910 DEFPROCposn
  920 IF G(X,5-Y)<>0 THENSOUND1,-15,89,2
:GOTO940
  930 GCOL0,PL+1:PROCpc(PL+1,OX,OY+112):
G(X,5-Y)=PL+1:PROCsd(PL):PL=PL EOR1:PROC
pl(PL):PROCsd(PL)
  940 ENDPROC
  950 DEFPROCcheck
  960 FORU=1TO2:FORV=0TO5:FORW=0TO5
  970 IFG(W,V)=0 GOTO1020
  980 IFV<3:IFG(W,V)=U:IFG(W,V+1)=U:IFG(
W,V+2)=U:IFG(W,V+3)=U w=U
  990 IFW<3:IFG(W,V)=U:IFG(W+1,V)=U:IFG(
W+2,V)=U:IFG(W+3,V)=U w=U
 1000 IF(V<3ANDW<3):IFG(W,V)=U:IFG(W+1,V
+1)=U:IFG(W+2,V+2)=U:IFG(W+3,V+3)=U w=U
 1010 IF(W<3ANDV>2):IFG(W,V)=U:IFG(W+1,V
-1)=U:IFG(W+2,V-2)=U:IFG(W+3,V-3)=U w=U
 1020 NEXT:NEXT:NEXT:ENDPROC
 1030 DEFPROCsize
 1040 PROCpr(7,OX,OY)
 1050 IFSI=1S=256:LM=4:CH=TRUE ELSEC=0:S
=128:LM=5:CH=FALSE
 1060 PROCpr(1,OX,OY):IFC<>2 SI=SI EOR1
 1070 ENDPROC
 1080 DEFPROCmark(CM,MX,MY)
 1090 GCOL0,CM
 1100 FORyc=MY TOMY+256STEP128
 1110 MOVEMX+24,yc:DRAWMX+104,yc:MOVEMX+
152,yc:DRAWMX+232,yc
 1120 NEXT
 1130 FORxc=MX TOMX+256STEP128
 1140 MOVExc,MY+24:DRAWxc,MY+104:MOVExc,
MY+152:DRAWxc,MY+232
 1150 NEXT
 1160 ENDPROC
 1170 DEFPROCw(W)
 1180 VDU19,7+W,1;0;19,9+W,7;0;19,10-W,0
;0;19,12-W,0;0;
 1190 I=INKEY(150)
 1200 GCOL0,0:MOVE262,116:MOVE1030,116:P
LOT85,262,884:PLOT85,1030,884
 1210 IFW=2w$="Santa" ELSEw$="Snowman"
 1220 PROCdb("The winner :",4,10):PROCdb
(w$,(20-LENw$)/2,14)
 1230 p%=0:SOUND2,0,0,3:SOUND3,0,0,6:FOR
I%=0TO16:FORD%=3TO5
 1240 p%=(p%+D%)AND31
 1250 SOUND1,2,p%*4,2:SOUND2,3,p%*4,2:SO
UND3,4,p%*4,2:NEXT:NEXT
 1260 ENDPROC
 1270 DEFPROCdb(D$,x,y)
 1280 VDU4
 1290 X%=d MOD256:Y%=d DIV256:A%=10
 1300 C$=CHR$254+CHR$8+CHR$10+CHR$255
 1310 FORn=1TOLEN(D$)
 1320 b$=MID$(D$,n,1)
 1330 COLOURn MOD2*3+1
 1340 ?d=ASC(b$):CALL&FFF1
 1350 VDU23,254,d?1,d?1,d?2,d?2,d?3,d?3,
d?4,d?4
 1360 VDU23,255,d?5,d?5,d?6,d?6,d?7,d?7,
d?8,d?8
 1370 PRINTTAB(x+n-1,y)C$:NEXT
 1380 VDU5
 1390 ENDPROC
 1400 DEFPROCpc(p%,xp%,yp%)
 1410 MOVExp%,yp%
 1420 IFp%=0GCOL0,4:PRINTA$(0):ENDPROC
 1430 GCOL0,1:PRINTA$(p%):GCOL0,7:MOVExp
%,yp%:PRINTA$(p%+2):ENDPROC
 1440 DEFPROCsd(pl):SOUND1,1,pl*36+80,2:
SOUND2,1,pl*36+200,2:ENDPROC
 1450 DEFPROCpl(pl):VDU19,8+pl,1;0;19,10
+pl,7;0;19,9-pl,0;0;19,11-pl,0;0;
 1460 ENDPROC
 1470 DEFFNag:PROCdb("Another game ?",3,
20):REPEATA=GET:UNTILA=89ORA=78:IFA=89 =
TRUE ELSE =FALSE
 1480 DEFPROCreloc(Q%):CLS:*T.
 1490 P%=PAGE:IFP%<=Q% ENDPROC
 1500 L%=TOP-P%:PRINTCHR$129CHR$136"Relo
cating...."
 1510 FORM%=0TOL%-1STEP4
 1520 Q%!M%=P%!M%:NEXT
 1530 PAGE=Q%:A%=138:X%=0:*FX15
 1540 $&100="OLD"+CHR$13+"RUN"+CHR$6+CHR
$13
 1550 FORL%=&100TO&108:Y%=?L%
 1560 Z%=USR&FFF4:NEXT:VDU21:ENDPROC
```

Get it right!

```
  10 =    0 0 | 270 = 9CC4 E | 530 = FE7A D
  20 =    0 0 | 280 = 75F7 4 | 540 = CA26 C
  30 =    0 0 | 290 = BE32 3 | 550 = DC02 A
  40 =    0 0 | 300 = 6A0F 8 | 560 = 720B 7
  50 =    0 0 | 310 = 2870 6 | 570 = 1F67 8
  60 = FE6F F | 320 = B8BC 0 | 580 = 58E7 C
  70 = 936C 2 | 330 = 8855 C | 590 =  C1D D
  80 = E8CD D | 340 = 484E C | 600 = 9619 C
  90 = 6670 8 | 350 = AC51 C | 610 = 7F90 A
 100 = 9538 4 | 360 = 72E4 1 | 620 = CA3B D
 110 = 2599 2 | 370 = D843 3 | 630 = F5C4 7
 120 = 344C E | 380 = CEAF 5 | 640 = A573 4
 130 = 1261 7 | 390 = 1BBF F | 650 = 6071 E
 140 = 3A7F E | 400 = B251 8 | 660 =  17B 2
 150 = 9B09 8 | 410 = ED0F 5 | 670 = FC2F 8
 160 = 9248 5 | 420 = F5B9 A | 680 = FF21 F
 170 = 325C D | 430 = 538A F | 690 = 3115 9
 180 = 8DB6 2 | 440 = 2545 E | 700 = D94F 4
 190 = 8040 8 | 450 = 63E9 8 | 710 = ED0F 4
 200 = B531 8 | 460 = 9A68 9 | 720 = 6CFC 4
 210 = 9960 0 | 470 = 4328 B | 730 = F270 E
 220 = 3D74 1 | 480 = 34E2 B | 740 = ADD6 4
 230 = 628F 7 | 490 = 2783 1 | 750 =  9E7 4
 240 = 338F 4 | 500 = 52F3 F | 760 = ED0F C
 250 = F2BA 8 | 510 = B45F A | 770 = C73A 0
 260 = C8A1 F | 520 = 9386 C | 780 = 5DFA B
```

```
 790 =  DB9 C | 1050 = 25A7 E | 1310 = 1C95 E
 800 = ED0F 8 | 1060 = C6D1 6 | 1320 = 1B4B 4
 810 = 539F 4 | 1070 = ED0F 7 | 1330 =   5E 6
 820 = 1278 3 | 1080 = A9AB 9 | 1340 = 87C7 E
 830 = CCD9 8 | 1090 = E831 1 | 1350 = 3822 6
 840 = 9F8A 9 | 1100 = 4AE5 A | 1360 = B722 5
 850 = 5F52 E | 1110 = 4D41 2 | 1370 = F521 8
 860 = F139 0 | 1120 = 2C83 B | 1380 = 667A 2
 870 = 4321 9 | 1130 = F447 0 | 1390 = ED0F 6
 880 = A688 5 | 1140 = CAE7 4 | 1400 = 6B9E 7
 890 = 24BD 1 | 1150 = 2C83 2 | 1410 = 5A46 6
 900 = 59E5 C | 1160 = ED0F 9 | 1420 = 84CA 5
 910 = B46F 9 | 1170 = 8F7E E | 1430 = E668 4
 920 = 9982 3 | 1180 = F87E C | 1440 = ABF0 F
 930 = 677C A | 1190 = BED8 4 | 1450 = 8A96 7
 940 = ED0F 5 | 1200 =  A2D 8 | 1460 = ED0F 8
 950 = 69A8 4 | 1210 = 7FF5 8 | 1470 = 1A8F F
 960 = 1D4F 5 | 1220 = 8E4B 4 | 1480 = BA15 4
 970 = 5F08 1 | 1230 = 7651 7 | 1490 = 8F78 9
 980 = C3D8 1 | 1240 = D5DD C | 1500 = 7545 6
 990 = 902F 4 | 1250 = 85F4 0 | 1510 = 5769 C
1000 = A205 8 | 1260 = ED0F 2 | 1520 = E316 C
1010 =  7B8 4 | 1270 = E566 7 | 1530 = AF02 E
1020 = E062 E | 1280 = 765B 6 | 1540 = 889C 3
1030 = 96E0 5 | 1290 = D6BE 3 | 1550 = 7ACF A
1040 = 51B8 1 | 1300 = 38D8 3 | 1560 = 302A A
```

Software for the Archimedes

£25.00 +VAT

INTER-CHART

A comprehensive chart and graph plotting package. Data can be entered directly at the keyboard or transferred from INTER-SHEET, INTER-WORD or INTER-BASE via file. This data may then be displayed in a variety of graphical forms, edited, printed, saved, etc.

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The most popular word processor on the BBC Micro is now available to work under the 6502 emulator on the Archimedes.

Wordwise Plus retains its ease of use and its flexibility, the full set of programming language commands, segments, 80-column preview, etc.

Wordwise Plus is supplied on disc for the Archimedes, so no ROM podule is required.

Price: Full package: £29.00+VAT (£33.35 incl.)
Upgrades: Existing owners of BBC Version, just quote serial No. Price: £10.00+VAT (£11.50 incl.)

Versions of the popular packages WORDWISE PLUS, INTER-WORD, INTER-SHEET and INTER-CHART are now available for the Archimedes, running under the 6502 emulator.

INTER-WORD, INTER-SHEET and INTER-CHART, like future packages already under development, are supplied in ROM form. Because the Archimedes has no standard sockets for additional ROMs, an additional 'ROM Podule' is required before they can be used.

Upgrades or exchanges available to existing owners. Please contact us for details.

The Computer Concepts ROM Podule

This ROM Podule will accept up to 8 ROMs, each of which may be up to 128K in size (and larger when used in conjunction with a PAL-controlled carrier). On-board software (also in ROM) provides a complete ROM filing system, offering high-speed downloading of software.

In future, the ROM board will be used by the Computer Concepts Archimedes Word Processor, Spelling Checker, Thesaurus, Drawing Package, etc.

The ROM podule is easy to fit and occupies one podule slot, allowing more than one to be fitted to any Archimedes.

Price: TBA. Anticipated availability: November 1987.

Computer Concepts Ltd

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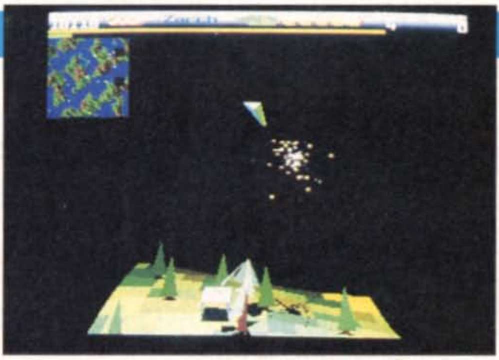
Archimedes

Zarch



YOU are the last fighter pilot on the planet and the invasion has begun. Out of the starry skies the Seeders are coming, scattering the red death that pollutes the ground and mutates the bushes.

The vicious alien fighters – flying in formation – try to engage your attention in dogfights, while the troop carriers drop parachutes on to the twisted landscape to produce the suicidal mutant fliers that make even the fighters look relatively harmless.

Slowly your map becomes criss-crossed with red streaks of infection as you fly across the landscape trying to protect it. Sections of the map turn grey as individual radar stations are knocked out. Will you be able to stop them?

If this were the advertising blurb for a shoot-'em-up game on a BBC Micro what would you expect? A Planetoid look-alike perhaps? Or if you're very generous, Elite-style 3D wireframe graphics, good but slow?

Zarch is in a different league altogether.

Technically, despite what Dave Braben said in the last issue, the game defies criticism. It is fast, colourful and superbly animated without flicker or even slowing down when there's a lot happening on screen – since the movement and actions of each object is being calculated even if it's off-screen.

But there are problems. If you've just come from playing Lander, the first thing you're likely to do is use up your two smart bombs – by pressing the middle button on the mouse – which on Lander was gentle thrust.

The left mouse button is for the one level of thrust available, midway between the two levels on Lander. I would have much preferred two levels as in Lander, and perhaps the spacebar for smart bombs.

Zarch is very difficult to play – after a fair amount of practice I got up to about 7500 – and you certainly don't have the time for sight-seeing that you have in Lander.

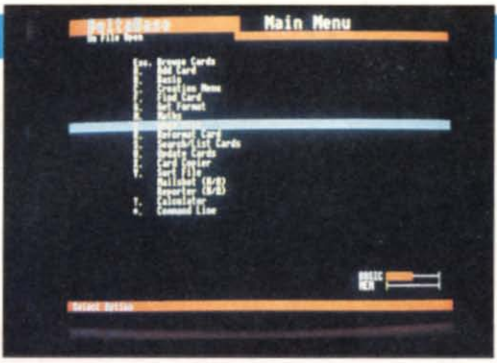
So to get the feel of it, boot up the game and watch it get to 50,000 in self-play mode.

Unquestionably this is a brilliant first game for the Archimedes, and will be a hard act to follow – but let's hope other games programmers will try. Since Zarch has nothing to be compared with, it stands at the baseline of all future games for the Archimedes.

Lazarus

Price: £19.95
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX
Tel: 0532 459453

Minerva Deltabase



ONE of the unique principles of Minerva's System Delta for the BBC Micro was the presence of a machine code program to deal with all the base level routines of database handling via a set of calls that could be used from Basic. This meant that the database application program itself could be written in Basic and was therefore easier to debug.

When the Archimedes appeared, Minerva's task was very simple: Rewrite the database handler into ARM code, and instantly all the Basic programs that worked on the BBC Micro plus the 6502 database handler would work on the Archimedes plus ARM database handler. Then start upgrading the Basic program itself to utilise the facilities of the new machine.

Well, Minerva did it, it works and the company was first with a database. The system performed well enough and for those who want a powerful but simple card file system it will certainly be sufficient.

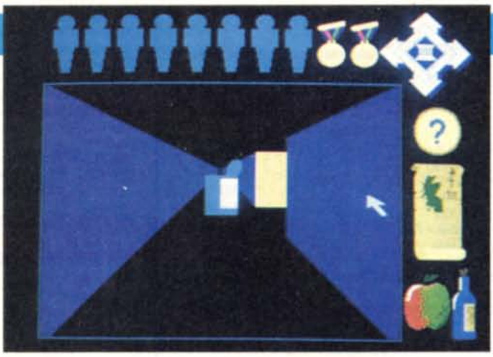
You can create card file layouts, enter the data and have several different groupings of data available at one time, along with all the usual database sort and select facilities.

If you're used to System Delta, then the Archimedes version will hold no surprises – which is a good thing. And if you're looking for a cheap database system with room for expansion then Deltabase could fit your plans.

Steve Turnbull

Price: £29.95
Supplier: Minerva Systems, 69 Sidwell Street, Exeter, Devon EX4 6PX
Tel: 0392 37756

Minerva Minotaur



I WAS looking forward to playing this game – after all, a maze game on the Archimedes is bound to be superb. The packaging gives a quick rundown on the legends of Theseus (you), the Minotaur and the Labyrinth.

The basic aim of the game is to enter the Labyrinth, rescue 10 men and kill the Minotaur although success in either of these last two endeavours will win the game. You lose if you run out of food or drink, or get killed by the Minotaur.

So far so good. Boot up the program and you are presented with a colourful loading screen which gives the options *Load or Design?*. Be sure that you press D for design and enter the size of maze as prompted – a minimum of 20x20 is accepted.

You watch the maze being designed, but that really doesn't help at all as the lines go zooming to and fro across the screen, and for a big maze it takes several minutes to complete this stage. You are then given the option to save the maze, and this is the only time you can – you can't stop halfway through.

The screen flashes and you are presented with a 3D view down a maze tunnel. Above the maze window is a series of grey humanoid shapes which represent the men to be rescued, while in the top right is the Minerva symbol with arrows pointing up, down, left and right.

Below this, on the right of the window, is a compass without a pointer, a map scroll without a map on it and at the bottom is an apple and a full bottle of wine.

Using the mouse to direct the pointer on the screen you select the up pointing arrow to move forward, at junctions you can turn left and right and if necessary you can go backwards by selecting down. For Basic the program runs quite fast.

As you move around the maze your food and drink level drops and you have to pick up extra bottles, or food in the form of opened tin cans.

Finally you either starve to death, or meet the Minotaur, who is also represented as flat colour. At this point, if you've found the sword you win – otherwise you lose, watching some blood run down the screen.

Minotaur is very simple and easy to play. It's a definite relief after Zarch and quite fun, but it lacks the polish of a professional game – it would make a decent magazine listing.

Steve Turnbull

Price: £14.95
Supplier: Minerva Systems, 69 Sidwell Street, Exeter, Devon EX4 6PH
Tel: 0392 37756

Clares' Toolkit Module

IN the early days, when Acorn hadn't even dreamed of Risc Machines, many companies brought out toolkit roms for the BBC Micro.

The primary function of these was to allow you, the user, deep but easy access into your BBC Micro. They allowed sections of memory to be moved, cleared or copied, disassembled machine code and performed a host of other – possibly useful – functions.

One of the most versatile of these roms was Clares' Ramrod. Now, with the launch of the Archimedes, Clares has pushed into the lead by releasing a Toolkit Module that combines simplicity with power.

Booting up the module was a simple case of Shift+Break with the disc in the drive. The disc is not protected and you are recommended to backup the master immediately. The configure options for the module are held on the disc within the program itself, so if you move the program or rename it you must first alter the configure *Path* option.

The basic aim of this Toolkit Module seems to have been to make the memory of the Archimedes as accessible and as modifiable as possible. And it succeeds superbly.

After selecting the *MEMORY command (*MEDIT in the production version) you are free to browse through the whole memory – with the display being in text, four-byte words, hex, binary or machine code – changing between them at the touch of a button. You can edit the memory in most forms, and editing in machine code is especially useful.

The scroll speed as you flip through the memory is ridiculously fast – at the auto repeat of my machine it scrolled through 28k of text in 10 seconds.

With more than half a megabyte of memory to wander through the module provides find commands for hex, word, text and machine code. When the find options are running the screen display flips through the memory as it is searched, but this can be switched off to make searches considerably faster.

There is a further set of commands which allow you to dump sections of memory in whichever format you prefer. There is one odd-man: The ENVIRONMENT command, which displays a list of important – to the system – addresses of routines and buffers.

The next major block of commands allow you to browse through a disc in the same way as you browse through memory – the only major difference is that when dissassembling the disc no branch can be evaluated.

All in all Clares' Toolkit Module is an excellent product and will no doubt see years of profitable use.

Steve Turnbull

Price: £39.95
Supplier: Clare's Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA
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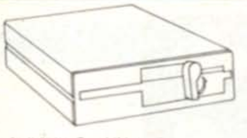

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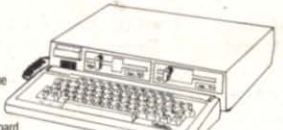

Give your BBC or Master micro a professional PC-look by replacing the existing lid with this smartly styled package which can house two disk drives. Complete with separate keyboard case and connecting cables. A full range of accessories is also available.

Stock Code	Description	Price inc. VAT
V0851	Viglen Professional Console Unit for the BBC micro	£49.95
V0861	Viglen Master Console Unit for the Master micro	£59.95

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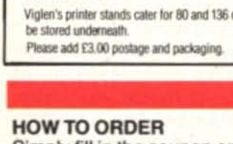
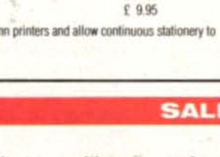
PRINTER STANDS





Viglen's printer stands are available in	Price inc. VAT
clear perspex, 80 col.	£19.95
136 col.	£29.95
high-impact ABS plastic colour-matched to most printers. 80 col.	£14.95
black metal finish	£ 9.95

Viglen's printer stands cater for 80 and 136 column printers and allow continuous stationery to be stored underneath.

Please add £3.00 postage and packaging.

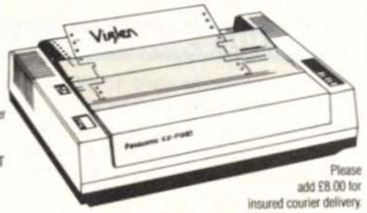
PANASONIC PRINTER KIT

The Panasonic KX-P1081 comes complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand.

Features include:

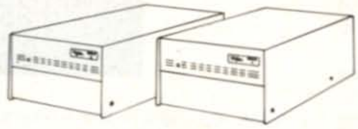
* 120 cps draft printing, 24 cps NLQ
* IBM and Epson compatibility through dip switch settings
* Prints 80 columns on A4 cut sheets, continuous stationery or roll paper
* 9×9 draft and 18×23 NLQ

Stock Code	Description	Price inc. VAT
SPO 79	Panasonic KX-P1081 plus accessories	£189.95



Please add £8.00 for insured courier delivery.

VIGLEN WINCHESTER DISKS



Plug-in 20 to 112MB of extra storage with the Viglen Winchester system.

Please add £8.00 for insured courier delivery.

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V0156	VB56 56MB Viglen Winchester	£1119.00
Drive 1 Second Drive		
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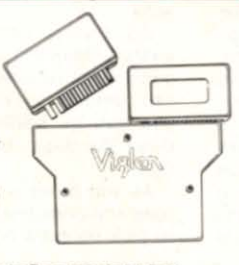
V0162	VB128 28MB Drive 1 Winchester	£ 599.00
V0165	VB140 40MB Drive 1 Winchester	£ 819.00
V0167	VB156 56MB Drive 1 Winchester	£ 899.00
V0157	20MB Tape Streamer Backup	£ 724.95

ROM CARTRIDGE SYSTEM



Designed by Viglen for use with the BBC B or Master micros, the Rom Cartridge System allows a range of Rom software to be used and interchanged easily without fear of damage to the delicate pins. The system is simple to fit and requires no soldering.

Stock Code	Description	Price inc. VAT
V0560	Viglen Rom Cartridge System for BBC	£12.95
V0559	Viglen Rom Cartridge System for BBC (low profile)	£12.95
V0550	Viglen Rom Cartridge System for Master	£14.95
V0561	Single Viglen Cartridge	£ 3.99

Please add £2.50 for postage and packing (£00.50 for single cartridge).

DAISYWHEEL PRINTER

The Panasonic KX-P3131 daisywheel printer is Diablo-compatible and utilises bi-directional logic seeking techniques to produce letter quality print at a rate of 17 characters per second (cps). Friction speed provides really efficient paper handling, whilst tractors are available as an option.

Stock Code	Description	Price inc. VAT
V0400	Panasonic KX-P3131 Daisywheel Printer	£299.95

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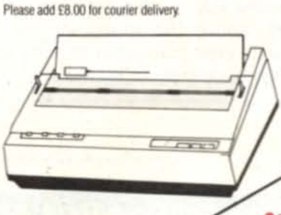

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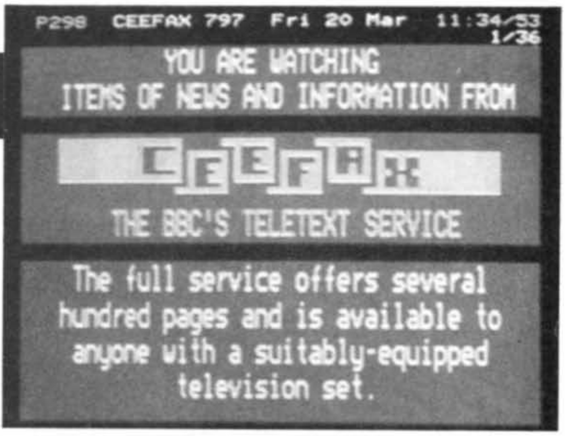

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Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.

November 6 to 12

T/SWR03
B/SWR03
The third instalment in our series explaining how to make use of sideways ram in the BBC Micro. SWR has been available for the model B for some time, and comes as standard on the model B+ and Master micros. Our latest series for programmers looks at how to make more effective use of SWR facilities.

CRMenu
Automatic disc-menu software to simplify the task of finding a specific file from one of several discs.

Yartzee
An interesting and entertaining implementation of the familiar dice game Yahtzee.

Osbits
Part four of our Osbits series guiding you through the complexities of assembler language programming on the BBC Micro. This fourth module looks at the memory allocation of the BBC Micro, and which areas can be used safely by machine code programmers.

Compressor
A utility to cut Basic variables to a maximum of two letters. Published in the February 1987 issue of *The Micro User*.

Review
Continuing the service offering reviews of educational software and hardware for schools.

Notes
Teachers' notes for a variety of BBC TV and radio educational programmes.

November 13 to 19

T/OSB05
B/OSB05
Osbits part five describes the two major operating system calls Osbyte and Osword, and shows how they can be used to simplify what would otherwise be very difficult tasks.

Dist
Cities
Loader
Note
Calculate the shortest distance between any two points on the Earth. Simply enter the names of two cities, and the length of the journey between them will be shown. Alternatively, if the chosen positions do not appear on the comprehensive list of cities available, just enter the longitude and latitude of the two points in question. The distance between them will be calculated.

T/SWR04
B/SWR04
Continuing our study of sideways ram, showing how to make effective use of SWR facilities.

Biomorphs
A facinating program from the April 1987 issue of *The Micro User*. It converts your BBC Micro into a fertile breeding ground for generations of creatures called biomorphs.

Review
Continuing the service offering reviews of educational software and hardware for schools.

Notes
Teachers' notes for a variety of BBC TV and radio educational programmes.

November 20 to 26

AutoLd
An alternative automatic telesoftware downloading routine. Choose all the programs you require from the catalogue, then let the micro download your selection without any further instructions.

6502SP
SPinfo
WWfkeys
A selection of utilities designed to run from sideways ram, offering 16 extra star commands, some of which are specifically for use with a 6502 second processor. The utilities provided include automatic saving of files at regular intervals during development, easy selection of a specific version of Basic, enhanced listing options, and many others.

T/SWR05
B/SWR05
Part five of our series designed to make more use of your sideways ram facilities.

T/OSB06
B/OSB06
Part six of our Osbits series explaining the techniques of assembly language programming explains the rotate and shift functions and shows how they are used.

Ludo
An excellent implementation of the popular family game from the May 1987 issue of *The Micro User*.

Review
Continuing the service offering reviews of educational software and hardware for schools.

Notes
Teachers' notes for a variety of BBC TV and radio educational programmes.

November 27 to December 3

OBJ
An assembly language source file editing system which can also be used as a word processor to write letters and so on. It allows you to enter and edit text or assembly language programs without having to worry about formatting.

T/SWR06
B/OSB06
Continuing our series designed to help make more effective use of the sideways ram facilities available on most BBC Micros.

T/OSB07
B/OSB07
This 7th module from our Osbits guide to assembler language programming on the BBC Micro takes a second look at operating system calls. This time we study those calls relating to input and output.

Prof McBrolly
Pit your wits against the goblins in this race against time from the June 1987 issue of *The Micro User*.

Review
Continuing the service offering reviews of educational software and hardware for schools.

Notes
Teachers' notes for a variety of BBC TV and radio educational programmes.

NEW FROM DESIGN PEOPLE SOFTWARE!

BATTLE OF BRITAIN

Battle of Britain is available on cassette or 5¼" disc.

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MIDWAY

in the BATTLEGAME SERIES

11th August 1940 . . .

Britain stands alone against the German war machine. In July, Adolf Hitler ordered his commanders to prepare plans for the invasion of Britain, named Operation Sealion. The German commanders insisted that they have air superiority over the Channel, or the Royal Navy could destroy the invasion force before it reached the shores of Britain.

BATTLE OF BRITAIN simulates the conflict that ensued. The player takes the place of the commander of the Royal Air Force, whilst the computer takes charge of the German forces. Under your command are the seven sector stations of Fighter Command. You receive reports from your radar stations on the coast, or if these have been bombed out of action, from the Observer Corps. Your forces are replenished from your fighter reserve and by production from aircraft factories — but you will lose both if the factories are bombed.

As if that were enough, bombing raids which penetrate your defences and reach your airfields will wreak havoc. All these and a host of other details are simulated by the Battle of Britain program.

Unlike 'Sink The Bismarck' and 'Tanks', 'Battle of Britain' does not include 'combat sheets' as the numbers of planes involved are so large, though it does use disc overlay techniques to allow a larger program.

Reviews:

"Full marks for simulations like this — an intelligent use of the computer that is never boring and doesn't require you to be a wargaming fanatic to enjoy playing . . . I do believe that many more of you would enjoy playing Battle of Britain than you might suspect . . . I'm eager to see the next in the series!" *A&B Computing, October 1987*

HAVE YOU TRIED BATTLEGAMES

Design People Software presents a unique series of battlegames for the disc-based BBC Micro. By using disc overlay and dynamic linking techniques, we are able to produce games which are much longer than the standard memory of the BBC. Our games are based on strategy, and we incorporate as many true-to-life facets of the action as possible. But you don't have to have reams of rules — everything is handled by the computer. But what makes our games different are the *combat sheets* — similar to mini-arcade games. You can take the place of the man on the spot, use your skills to influence chance.

TANKS is a World War II tank battlegame for 1 player. You have a choice of three spheres of action — Western Europe 1944, North Africa 1942 and Russia, Winter 1943. The program handles all of the complex rules for playing wargames, leaving you to concentrate on the strategy. Your tactics must deal with enemy tanks, mines, aircraft and fortified positions, while keeping your own tanks refuelled and achieving your objective. ***DISC £12.95 + £1.00 p&p***

REVIEWS:

"I don't know what the traditional wargaming fraternity will make of this, but I think it is excellent and, even more than *Sink The Bismarck*, will provide a wide audience to turn to a different sort of strategy game. I'm sure that this would appeal to far more of you than you suppose — try it and see!" *A&B Computing April 1987*

". . . this game is one of the best warfare simulations available on the BBC Micro. Highly recommended without reservation". *Acorn User, July 1987*

BBC B/B + /MASTER 128. 40/80 track dual format.

SINK THE BISMARCK is a simulation of the battle between the German super-battleship Bismarck and the Royal Navy. The game takes place over the whole North Atlantic. You have just twelve ships with which to find and tackle the Bismarck. But there are other problems too: U-boats, convoys to defend, and the ships' fuel reserves. ***DISC £10.99 + £1.00 p&p***

REVIEWS:

"Sink The Bismarck has the perfect balance between pure strategy and an arcade game" *Micro User January 1987*

"If you've never tried a warfare simulation then may I suggest that this would be a good place to start? Well designed, playable and good value for a disc-based game." *A&B Computing December 1986*

BBC B/B + /MASTER 128 40/80 track dual format

All games are compatible with the BBC B,B + and MASTER series. All orders will be despatched by return of post.

Design People Software, 77 Grimwade Street, Ipswich, Suffolk, IP4 1LN

EDUCATION NEWS

Appropriate statistics

A STATISTICS program aimed mainly at geography and biology departments has been released by Granada Education Software (0732 883261).

Status, which is claimed to be the only statistical package that selects appropriate tests for students, is also applicable to economics, social and computer studies classes.

Having answered a series of questions the student enters the data which has been collected.

The program then displays and explains calculations as they are carried out, transforms data if necessary or requested, produces final statistics, gives the appropriate significance table and offers the option to display results in graphic form.

Status provides a range of statistical tests, including descriptive, graphics and analytical statistics. Price £19.50

ESG conference

FOLLOWING the government's announcement to create 700 advisory teacher posts for the promotion of Information Technology, Resource in Doncaster is staging a major conference to explore a number of issues.

The conference title is Coping with ESG (education support grant) and the event will take place in Doncaster on December 3.

Speakers will include Roger Broadie from Acorn Computers, Richard Fothergill, director of CET and the deputy director of Microelectronics Support Unit, and Ralph Tabberer, who is responsible for the curriculum.

It is expected that a large number of interested parties will attend, including advisers, HMI, curriculum development organisations, computer centre managers and teachers already committed to the use of Information Technology in the classroom.

The day will be run as a series of seminars and lectures with a continuous exhibition. Attendance at the conference is free, and further details are available from Nick Evans on 0302 63800.

New contender

CHILDREN who are learning to spell with the popular Chalksoft program – Spelling, Week by Week – now have a new program to contend with.

The original package for the BBC Micro has 3000 words that are graded and grouped and presented to children over a period. It points out mistakes, keeps details of scores and gives a new list of words to learn.

Following requests from teachers to produce a program that would allow them to type in their own words for the children, Chalksoft (0775 69518) has released Spelling – your own words.

The new package has 10 sets of 20 words, all of which can be amended by the teacher. Variables such as the number of words to be tested, how many chances the child gets on each word and how long the word is shown on screen can be reset.

Chalksoft says that tests have shown the program to be of value to students in the 7 to 18 age groups and to those in special education. Price £15 for the BBC Micro and £17 for the Compact.

Reading skills

A READING program in the Read-Right-Away series for 7 to 10-year-olds has been released by HS Software.

Reading Pack 3A contains two games that deal with specific skill areas of reading.

In Monster Hunt (silent letters) the player has to help a spaceman hunt out the silent letter monsters while watching out for the spaceman-squashing gorg.

Surfari (si, ti ,is) is a surfing extravaganza in which the player has to tackle crocodiles and monster waves while trying to find the missing letter in words that contain the letter I. Price £11.95 on 5.25 and 3.5in discs.

A bumper pack containing eight reading games is now available for the Archimedes priced at £19.95.

Poly upgrade

COVENTRY Polytechnic has upgraded its suite of language learning software – Unitext – to run on the Archimedes.

Unitext allows teachers to create text files for students in English, German, French, Italian or Spanish using a full range of accents and special characters.

The program has a number of word processing capabilities so that text can be entered, formatted, edited and printed out. Unitext interacts with all of the polytechnic's student testing programs.

Price £30 from Coventry Polytechnic's Department of Language Studies (0203 24166).

Better spelling

A SPELLING tutor for the 9 to 14-year-old age group has been released by School Software (010-353 61 45399).

Better Spelling is a structured learning course with the emphasis on aspects of spelling that give most trouble.

The program approaches problems by assigning exercises in areas such as prefixes, suffixes, present participles and irregular and ordinary plurals. Price £14.95 on disc.

New concept in keeping in touch

A COMMUNICATION tablet modelled on the Concept keyboard has been released by Toucan Communication Aids.

The Learning Tray is a full A3 scanning device which can lie flat or be angled using the carrying handle.

It is marked out in a 128-cell matrix, while beneath the grid a bright scanning light can be directed using a switch or switches.

The light can be used to point to any desired message, symbol or picture on an overlay of any design. It can be used by pre-school children and non-readers.

For people with no intelligible speech it is claimed to be a simple communicator, and one that will suit all levels of intellectual capacity.

Toucan (0270 588039) say the Learning Tray can be operated by a wide range of switches, including puff and suck and both chin and hand held switches.

Software for the A3 Concept keyboard can be used with the Learning Tray without any modification except for a translucent overlay, which can be traced or produced on a photocopier.

The Learning Tray is supplied complete with the necessary cable to interface it with the BBC Micro via the user port.

Price £425.

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Top marks for maths package

4MATION Software has, justifiably, earned an excellent reputation for the quality of its software. Such classics as Granny's Garden, Flowers of Crystal and Dragon World have been joined by some new pieces of general educational software.

The latest release, The Big Calculator is totally different, being a specific mathematics teaching aid. On the face of it, it sounds a simple and none too original idea, but, as might have been expected, 4Mation has found some new twists to liven things up.

The basic idea is that a screen-sized calculator is shown and an arrow can be moved to the various "buttons" to select the appropriate functions. The facilities are those of a simple arithmetical calculator with the 10 digits (0 to 9), four main functions (add, subtract, multiply and divide), together with square root, percentage and sign change buttons. There is also a calculator memory option as well as a cancel and an off button.

You can select from a full range of input devices: Mouse, keyboard, concept keyboard, light pen, touchtech or joystick. Tracker balls can be selected either as a mouse or as a joystick. The software to drive these devices is included on the disc. There is no need to have a mouse rom fitted, for example.

The supporting materials include overlays for A4 and A3 sized Concept Keyboards. Selecting any of these devices does not prevent directly typing in numbers and functions from the keyboard. At this stage, selecting an input device is temporary – forgotten at switch off – but by moving the arrow to the bottom of the option screen, the disc editor can be selected.

This allows you to permanently produce a required set of start up options. The first allows the disc to boot up with the correct input device. It is also possible to alter the response speed for the selected input device, the left-hand margin on printouts and whether the clock should show 12 or 24 hours. The Mode 1 screen can be altered to produce a whole range of tasteless colours. I found the original default colours best.

Perhaps most exciting is the ability to configure your own calculator. There are 40 possible key layouts of which 32 can be edited by the user. It should be possible to copy most common layouts.

The eight layouts which can't normally be edited have special purposes – calculators in number bases 2 to 9. Children of all ages do mathematical work with different bases and these special calculators can greatly enhance that work. An extra program allows a number to be displayed in a range of different bases.

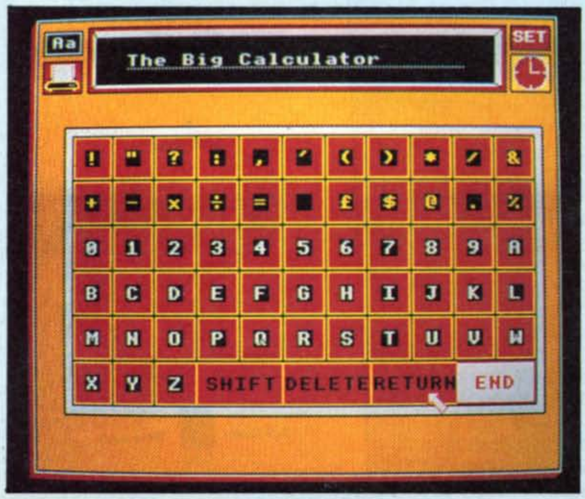
The calculator has a clock with stopwatch and alarm facilities. On a BBC B, the clock has to be set by the user, but on a Master, the on-board clock is automatically accessed.

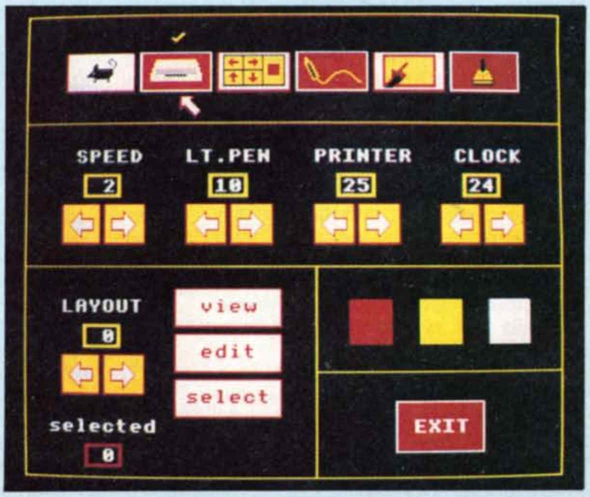
The 33-page handbook is a model of perfection. It contains detailed but clear information on the running of the program together with first rate advice on the usage of the software, and calculators in general in the classroom.

The original aims of the program were concerned with handicapped children. However the entire package has become a powerful tool with uses for children of all ages and abilities.

Sue Frost

Program: The Big Calculator
Price: £16.10 (disc)
Supplier: 4Mation Software, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ
Tel: 0271 45566
Requirements: BBC B, Master and Acorn Electron




SPEED 2
LT.PEN 10
PRINTER 25
CLOCK 24
LAYOUT 0
selected 0

Mechanics get a rocket...

Program: Mechanics and Electricity
Price: £23.
Supplier: Soft-Teach Educational, Sturgess Farmhouse, Longbridge Deverill, Warminster, Wiltshire BA12 7EA
Tel: 0985 40329
Requirements: BBC B and Master

THE aim of the nine separate programs on this disc is simple. It is to provide animations and simulations of some fairly tough physics concepts. They are not perceived as teaching programs and they make no claim to "replace" a teacher. In fact, most of the programs require an input from a physics expert and do not stand alone.

The first three programs are concerned with the equation *force = mass x acceleration* as applied to horizontal and circular motion and slopes. You can specify an object mass, frictional force and the pushing or pulling force. Spatial and time graphs are drawn of the events created.

Program four is concerned with rockets and acceleration. Values for mass and initial thrust are entered and the rocket will then visually launch, leaving half second markers behind it. It's a good demonstration of an accelerating object.

The next program attempts to measure the acceleration due to gravity. A circuit diagram is included with the package. Making this will give you the hardware device required for this experiment. It is a relatively simple and cheap piece of equipment which connects to the computer's analogue port. An object is knocked off some kind of a switch which starts the timer. Timing stops when the falling object hits the floor.

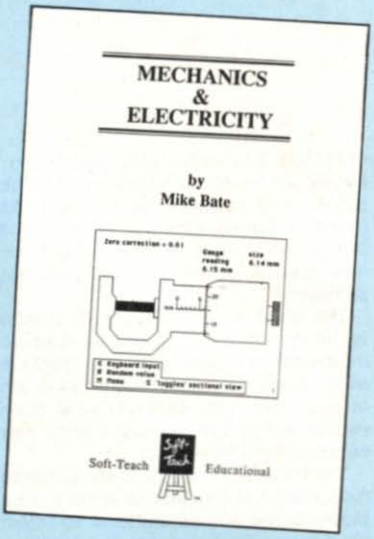
A ruler is used to measure the distance between the two points and then the required calculations are performed by the computer with the graph shown. The hardware device could be a simple soldering task for pupils on electronics or technology courses.

Next comes a demonstration of a rotating electric motor. I can't see what this offers that the usual set of diagrams in a text book don't. This is followed by a demonstration on vector addition and the parallelogram of forces.

Finally, there are screen sized pictures of micrometers and vernier callipers which a teacher can use for a demonstration tutorial or a student could use for practise.

In general, I can't recommend this package. The screens are muddled and untidy and do little that a good text book couldn't. The only program I feel I might use in my physics teaching is the accelerating rocket.

Rog Frost



MECHANICS
&
ELECTRICITY

by
Mike Bate

Soft-Teach Educational

On right wavelength

Program: Rays and Waves
Price: £27.60
Supplier: Soft-Teach Educational, Sturgess Farmhouse, Longbridge Deverill, Warminster, Wiltshire BA12 7EA
Tel: 0985 40329
Requirements: BBC B and Master

THE entire package consists of 12 programs on disc plus a simple, but useful handbook.

Many science teachers will welcome help with this problem area of the syllabus. The old ripple tank experiments never seemed to produce quite the result the text books indicated. Computer simulations are, for once, a good idea.

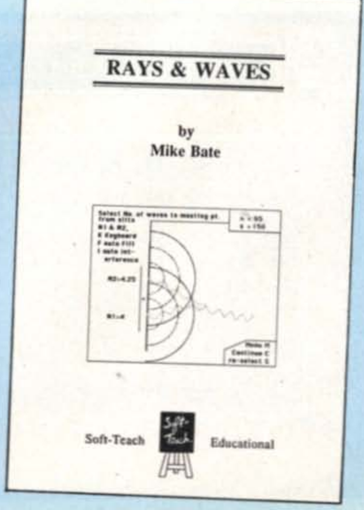
The programs cover a full range of wave "experiments". Starting with experiments on refractive index and critical angle, moving through wave reflection and refraction – with very good animated sequences – to superimposition of waves. There is then a program concerned with frequency and amplitude modulation before moving on to the more advanced Young's slits experiment, a diffraction grating and finally a section (with ear-splitting sound) on the Doppler effect.

These programs are simple in outline, and rely on a physics expert to do the teaching. It would be little use sitting a student at the computer with this software. As part of a lesson, involving reality as well as simulation, they are all first rate programs – particulariy when you consider how difficult reality is with wave energy.

The quick(ish) Epson screen dump facility – a feature of all of the software in the Physicat range – has worked overtime for me, producing hard copy of the neat, tidy screens.

Rays and Waves is a thoroughly worthwhile package with the modulation program outstandingly useful. My only reservation is the rather steep price, but despite this I would still recommend this collection of programs to science teachers everywhere.

Rog Frost



RAYS & WAVES

by
Mike Bate

Soft-Teach Educational

PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

SUMMARY of DIAGRAM II FEATURES

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.

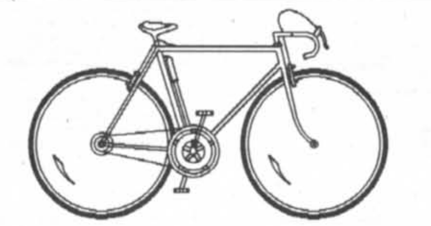


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Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.

DIAGRAM II — £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board draughting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

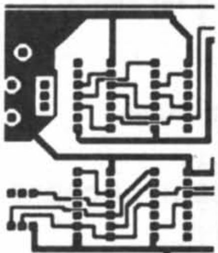
The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + vat



PCB PLOTTER DRIVER

A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output.

In this way plots may be produced directly onto film or even directly onto copper board with an etch resistant pen if a suitable plotter is available. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

All the features of the printer driver are included, such as the automatic thinning down of tracks between roundels. Mirror image plots are also available.

PRICE £35.00 + vat

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	**£ 60.00 + vat**
For Master 128 (with Pointer Rom)	**£ 60.00 + vat**
Bare Trackerball (no software)	**£ 49.00 + vat**
Pointer Rom - available separately	**£ 12.50 + vat**
Trackerball to mouse adapters	**£ 8.00 + vat**
Postage & packing on Trackerballs	**£ 1.75**

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 20 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT.

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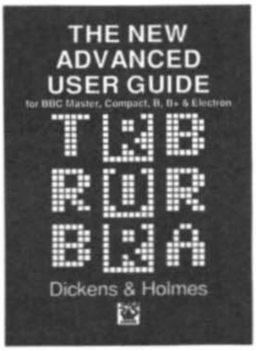
The New Advanced User Guide is carefully cross referenced and contains an extensive index and useful glossary. The 448 pages are wiro-bound for durability in use, and a wrap-around cover allows for easy identification in a bookshelf.

Adrian Dickens and Mark Holmes are both respected authorities on the BBC Micro and between them have extensive experience of using, programming, and writing about the BBC micro in all its forms. This book is liberally sprinkled with examples and ideas for extracting the most from this range of computers. No serious programmer of the Acorn BBC series can consider not owning a copy of this reference manual.

ISBN 0 947929 05 3

448 pages £19.95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VISA

Beebs in arms

Mike Gerrard takes a look at the BBC Micro overseas

THE BBC Micro is well-known as being particularly reliable and not prone to going wrong too often, but if you've ever had a problem and grumbled at the inconvenience of having to return your machine to the shop, what happens if you're a serviceman stationed somewhere like Cyprus?

It may be a three-hour drive to the nearest town, and in the nearest Cypriot town are you likely to find anyone who knows anything about BBC Micros? Well surprisingly enough, thanks to a company called SSVC, you may well do.

The Services Sound and Vision Corporation is responsible for supplying micros and other electrical equipment to the armed forces, including forces childrens' schools and individual servicemen and women. They are also responsible for maintaining the equipment afterwards forever and a day, a duty they take very seriously indeed.

Their public relations officer, Roger Edward-Jones, explained to me how SSVC came to add micros to the equipment that they sell.

"There is an organisation called SCEA, which is the Services Children's Education Authority, who originally were buying and using a variety of micros overseas. When they ran into technical problems we serviced them, no matter where they had been purchased. Eventually this presented such a problem that we advised them to standardise on BBC Micros.

"They accepted this. We were also asked to supply and maintain them, as well as to provide peripherals and advise on the whole system. SSVC applied to Acorn for the franchise, was assessed by them and became an Acorn Approved Service Centre. This relationship has blossomed to such an extent that sometimes Acorn call on us for advice, particularly because of our extensive video experience".

SSVC itself came into existence roughly five years ago as the result of a marriage between SKC (Services Kinema Corporation) and BFBS (British Forces Broadcasting Service). Both of these parent organisations came into being shortly after the war as a means of continuing the very necessary entertainment and training support services provided for the troops.

I was glad that James Walker was around to explain the various initials. James is head of management services at SSVC's headquarters, a 130-acre site looking not unlike a film studio as it nestles among the various Chalfonts in the Buckinghamshire countryside.

"On site here", James told me, "we have about 350 people, and of the 130 acres there are only about 32 actually inside the perimeter. A lot of the rest is just made up of fields that we rent out to the local farmers.

"We have a film library, and we record and distribute videos for sending out to schools. We also record radio and TV programs for duplicating and sending out to the Forces overseas – with permission, of course! We organise live shows for the services as well. You may have seen the one on TV with Jim Davidson in the Falklands – well that's typical of that side of things.

"We're involved in the making of Royal Navy, Army and RAF training films – we have our own crews and studios. We maintain lots of the electronic equipment which the services use both for training and entertainment. We repair TVs, videos and projectors as well as computers. Our aim is to provide service to the serviceman in terms of sound and vision, as our name suggests.

"We also sell a lot of the equipment in the first place.

"We sell TVs and videos, more predominantly now in the Western European market, such as West Germany. Just as any shopkeeper would do, we sell micros like the BBC Micro and Commodore 64 – they're the two most popular computers among servicemen. We also sell all the software that goes along with them – games, educational, anything, just like any other shop. If you take a place like Dortmund in Germany, we have a shop there where you can hire video tapes, buy TVs and hi-fis, and one section of the shop is the computer department.

"We don't sell them direct to the forces schools, that's done through the SCEA, but there it's predominantly BBC Micros because of their educational

Turn to Page 84 ►

Pupils at St George's School, Hong Kong, evidently enjoy their lessons on a BBC Micro

◀ From Page 83

involvement. There is this system called procurement, which doesn't mean what some people will think it means.

"What happens is that the SCEA will say to us 'Get 300 BBC Masters,' so we go and buy them all and store them. Then SCEA will say to us later, 'Right we want four to go to Osnabruck,' so we deliver them and if they break down we go out and fix or replace them and bring the faulty machines back to our workshop here for repair".

Roger Edward-Jones: "We have two sides to our workshops. First we have a projection workshop, which used to be mostly the mechanical things, all the slide projectors, cinema projectors and so on, but now includes electronics too. The other side is the electronic workshop itself, which initially was video projectors, video cameras and so on. That has expanded as the SCEA schools went more and more into computers, and at the last count there were 123 of those schools covering the whole range of primary, junior, and secondary".

Carl Jones is the engineering manager (electronics) at SSVC, and I asked him if BBC Micros were prone to different kinds of faults when used in different climates.

"No, we don't have any particular problems as a result of the climates. They're used in Hong Kong, Gibraltar, Cyprus and most of all, of course, in West Germany, with I suppose somewhere in the region of 1200 machines in those places, which we're responsible for maintaining.

"The only major problem has been with the new 128, which doesn't seem to like to travel. That's nothing to do with the machine itself at all, just that Acorn changed the polystyrene packaging that they ship the machines in.

"They now get knocked about a bit more in transit, so it's usually a case of them not being functional when they arrive, rather than faults developing in use. I've been on to Acorn about the packaging, though, to try to get them to do something about it.

"Micros are very hardy machines. They can function well in cold or hot climates, though what they don't like is sudden changes in temperature. Keeping them in reasonably controlled conditions is what's best, at a temperature roughly between 62 and 75 degrees Farenheit, which is what we recommend for the video equipment we also deal with. That's for storage, rather than in use.

This intense young BBC Micro enthusiast attends King Richard's School in Cyprus, one of many armed forces educational establishments around the world

"We have to adapt the mains supply slightly for overseas use, but otherwise the machines aren't in any way special. Where the BBC Micros are, the climates are all fairly conventional, we don't have any going to the more extreme places where the Forces are stationed, such as Belize or the Falklands, although I think the Royal Navy did take one down to the Falklands as part of an exercise.

"Wherever the machines are we have local technicians or there are service technicians to deal with what we call first-line problems. But if it's anything too specialised – something specifically relating to it being a micro rather than just a piece of electronic equipment – then it comes back here to the labs for us to deal with. We have seven engineers here, and three workshop assistants, but that's to cover all the maintenance and testing that we do.

"I do think that the BBC Micro is the best domestic micro in the market. That's why they're heavily in use and why we recommend them. They have no rival from our point of view when it comes to educational use, obviously, and that's a large part of why we recommend that people use them.

"But purely from a technical point of view, I don't think the BBC Micro has any rival, and I've put most machines through their paces here. They all undergo a strict evaluation, and I find quite often that machines do not meet the specifications that the manufacturers lay down for them. The BBC Micro is the only one that is satisfactory in that respect. Our experience suggests that it also interfaces with video equipment much more readily, and that's another large use it has".

Because of the market that SSVC represents, and the technical facilities at their disposal, they now find that manufacturers will approach them and ask them to have a look at something they're bringing out to see if they think the Forces might like to use it.

This enables them to keep very much in touch with what is on the market, and what is going to be coming on the market. It also provides valuable feedback to the manufacturer, though they may well find that Carl Jones is telling them their machine doesn't live up to its specifications.

Every machine that leaves the SSVC workshop, even a new one, is checked to ensure that it is working satisfactorily, and that applies to televisions and videos as much as computers.

As Roger Edward-Jones explains: "We don't want it to get out to Central America and find that it has a basic fault that makes it unusable. So unlike most people, when someone buys their stuff from us it has already been unpacked and all the bits assembled and checked and switched on and all the rest of it.

"If someone insists on buying something that neither James Walker nor our supply people nor the engineers

Turn to Page 86 ▶

Archimedes
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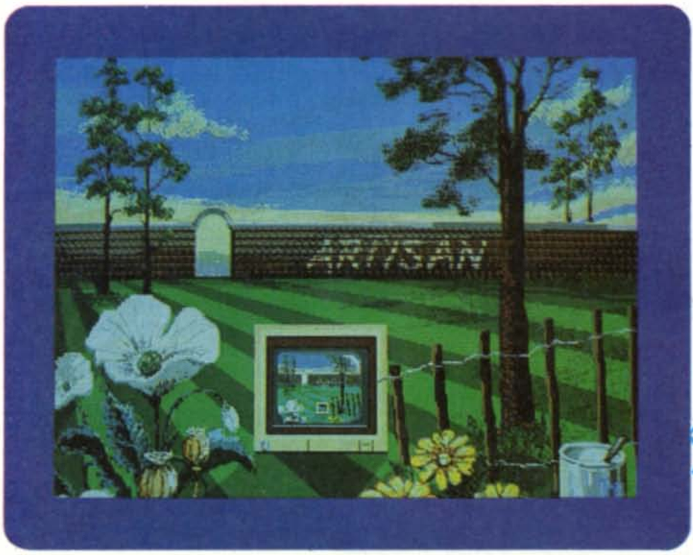

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◀ From Page 84

would recommend, we'll still buy it for them.

"They are, after all, our customers, so we'll buy whatever they want within reason, and they'll get it at a better price than they'll get elsewhere. But if we didn't recommend it then we wouldn't necessarily take on the maintenance of it – it depends on the circumstances and what it is they're buying".

Another factor that's significant for BBC Micro owners is that SSVC takes broadcasts from all four British television channels to certain places, and that includes teletext.

When the service was first introduced into Germany, in order to be impartial, Ceefax was broadcast for the first six months and then a switch was made to Oracle. When that switch was made, BBC Micro enthusiasts in the services lost the chance to download programs from Ceefax Telesoftware.

"We produced a few of the little black boxes that you need in order to download these programs", Roger Edward-Jones told me, "but we had to sell it with a disclaimer that we couldn't guarantee we were going to be able to continue to supply the Ceefax Telesoftware service, because there are other considerations to take into account as well, and we have to try to cater for everyone, not just the BBC Micro buffs.

"We have a very different attitude towards what we supply than most people. What other companies don't have to do is to maintain the machine for the whole of its life no matter where in the world it might go.

"We know that if we were going to recommend something cheap and cheerful we would still have to maintain it, be sure we can always acquire spare parts for it, and if we know it's going to take four hours for every minor repair then we're not going to recommend it.

"On the educational side, the teachers who are employed in the forces schools in Germany and elsewhere are teachers from the UK. Naturally enough they have friends who go out and visit them while they're abroad, and they get into conversation about the maintenance of computers and other equipment. And I'm not shooting you a line when I say this, I promise you, it has actually happened – they're so impressed with the way that the schools are supported in Germany that they ask the teachers there who does it, how do they manage to always have their kit up and running?

"There are few organisations here that have the one policy-maker – the MOD, or SCEA in this case – with a dedicated firm to buy, check, supply and maintain their equipment. But the way it works successfully in those forces schools is because of the unique service that this unusual corporation provides.

"And yet it still makes money, even though SSVC is a registered charity and therefore a non-profitmaking organisation. One of the pleasant parts of my job is arranging publicity when handing over large cheques to worthy services causes".

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,604 (the Whisper), the dearest £2,892 (the Cheetah). You will also need a separate telephone line, costing £101 to install, plus £404 a year rental. That's a total outlay over the first year of a minimum of £2,109. (All prices include VAT.)

Or you could do what more and more BBC Micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. You can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free telesoftware programs directly into your micro . . . and much more.

But why use Telex?

Because it's a standard means of instant communication between businesses. Today there are 150,000 Telex machines in use in Britain – and more than 2 million worldwide. It's used to dramatically speed up business communications – just as quick as using the phone but far more efficient, because you have a hard copy of every "conversation" for your records.

But there's a big bonus you get when you use *MicroLink* for Telex that the conventional way doesn't offer.

With *MicroLink* you don't HAVE to be in your office to send or receive Telex messages. You can just as easily use your computer at home (or even a portable). So now you can check whether there are any Telex messages waiting for you – anywhere, anytime. How's that for your business efficiency?

How to join: See Page 31

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EDUCATION LETTERS

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

And for handicapped

I WORK as an instructor with mentally handicapped adults in a Social Education Centre, which in the near future hopes to have a computer installed for educational needs.

The choice of computer has not yet been fully finalised, but is most likely to be one of the BBC Micro series. Therefore I was hoping that you could assist the centre regarding information as to the micro that would be of greatest benefit to mentally handicapped adults.

Any assistance that you might be able to offer us would be gratefully acknowledged. – **Anthony Gartland, Co. Armagh. N. Ireland.**

● The most important consideration is that you should have the maximum number of expansion ports available so that you can connect your micro to as many peripherals as possible.

Also, you need to ensure that a good selection of software that suits your needs is available. At present the BBC Master is probably the best choice.

Maths and micros

WHY is the teacher in charge of computer studies in most schools a mathematics teacher? They tend to confine the use of computers to their department and in effect the BBC Micro becomes a glorified calculator.

Computer studies should not be taught as a subject in its own right, especially if it is only to be taught by teachers who have no formal qualifications in the subject. A geography teacher wouldn't be allowed to teach French without any qualification in that subject, so why should a mathematics teacher teach computer studies?

Computing should be introduced into all subjects from primary school upwards. Children will meet computers in all walks of life when they are adults so they should see them in all subjects at school.

Many schools now have at least one room full of BBC Micros (or a cupboard full of them) and with the wealth of software available for most subjects they should be used across the curriculum and not just for computer studies. – **P. Jones, Swindon, Wilts.**

Normende memories

CRI de coeur! Can you or any of your readers help me with some information?

In the school where I teach we have a Normende TV/monitor, but no details of the connections to the RGB input from the BBC Micro.

I do have the appropriate plug, but when I wrote to an advertiser who used to sell these TV sets, asking to purchase a complete lead or the instructions how to make one, the request was totally ignored.

Any help would be greatly appreciated. – **David E. Taggart, Skipton, N. Yorks.**

● Can any of our readers supply the necessary diagrams?

Educational programs

I AM writing in response to the letter from Shelley Gibson expressing concern over bad educational programs.

First, it is a fact that most so-called educational programs are bad. However, I am surprised that with a little care and some time Ms Gibson has been unable to find any of the excellent programs on the market.

For instance, the BBC Maths with a Story programs are educational in the real sense of the word in that they actually teach rather than just test.

Children never get bored with them and they only ever require one key press for a response.

They are absolutely uncrashable and, not least, they are cheap. I must say that there are plenty of other examples, and better ones are found by teachers who use the computer as a tool for extending work – in databases, word processors, investigations and so on – rather than just a toy in the corner to play games on.

Other excellent educational programs are Quest, Pendown, Logo, Edword, Pirate, L and Spooky Manor. They are all very difficult to crash. – **Graham Conridge, Leyton, London.**

Mouse that pleases

I WOULD like to say what a superb education package the Quest Mouse together with Quest Paint from Watford Electronics is. I bought it to create some displays using digitised pictures that I already had, and it worked fine.

Recently, however, my six year old son decided to have a try. In under two hours he had mastered the buttons and drawn his first picture. He first drew the one house – having fun changing between pencil and airbrush – and was soon adding colour to his creation.

I showed him how to cut and paste, and when I accidently made the second house slightly smaller he remarked that it looked further away.

He soon mastered the technique himself so not only was he having fun drawing and familiarising himself with today's technology, but he was also learning something about perspective as he added more houses himself at varying depths.

It may not have been a masterpiece, but after such a short time with the mouse I felt that it was an excellent effort and showed that learning at home can be fun.

I'd be interested to hear if any other readers have found software or hardware that I can use at home to help educate my children. – **L. Davies, Sale, Cheshire.**

The slow answer

I was set the following problem as part of my mathematics homework:

While I was idly pressing numbers on my calculator I got an answer of 0.612015. All I can remember is that it was two whole numbers that I pressed with a mathematical symbol between them, and both numbers were less than 1000. What were the two numbers?

I wrote the following short program on my BBC Micro but it took about two hours to give me the result:

```
 10 FOR A%=1TO1000
 20 FOR B%=1TO1000
 30 IF ABS(B%-.612015*A%)
<.0001 GOTO 100
 40 NEXT
 50 NEXT
100 PRINT"RESULT IS"A%"AND"B%
```

This gives the solution, but can any of your readers come up with a program that gives the required answer and runs faster? – **Sarah Capper, Marple, Stockport.**

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● BBC B Acorn DNFS, ATPL rom board (16k ram), modem, many games £200. Microvitec lo-res monitor £80. Tel: 0454 323081.

● Electron plus-1, plus-3, data-corder, s/wram, view, other roms, software. Good condition all working order only £310. Tel: 0625 871909.

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● Sideways ram 16k plug in units no soldering comprehensive software r/w switch £12. Also rom images. D Parkinson, 41 Milroy St, Liverpool, L7 1PS.

● Graphpad 2 unused with software £30, Mini Office, Micro Olympics, Graphics packages many others. Tel: 0628 35343.

● Opus double density interface and support rom £40. AMX super-art package £35. Tel: 0384 270985.

● BBC buggy, complete with grab arm, pen kit and work board, programmes on disc and tape £200. Tel: Bognor 0243 864867.

● Master 128 £350. Dual ds 40/80t drives psu £115. Microvitec monitor £99. RX-80 printer £99. Lot £650. Tel: Hemel Hempstead 0442 45782.

● Disc drive for BBC s/s 40/80 track £60. Tel: 0484 683289.

● Swap Graphic adventure creator, Lord of the Rings, Egyptian adventure for Pro-punter or offers, all originals. Tel: Shelley 0604 767350.

● Acorn Prestel apdapter with rom £50. Tel: 0858 62985 after 3pm.

● BBC disk drive 40t £45. Opus challenger 256k works with your own disc drive instructions. Original packaging £70. Mini Office II rom version boxed, manual new £45. Tel: 051 737 1243.

● BBC B 40/80 disc drive, speech, lightpen extras £380 o.n.o. Tel: 01 554 7184.

● BBC B 1.20, Viglen 40/80 track 400k disc drive, disc doctor, Scribe, DFS speech system, colour television plus 100+ cassette games, 30+ disc games box and more. Will separate. Offers welcome. Tel: 0639 3661.

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● BBC B issue 7 1.2 os, Watford DDFS, 40/80 disc drive, Maplin modem 300 baud, Tandy 4 colour plotter-printer, Volex teletext adapter, Acorn speech chips, View wordprocessor rom, manuals, discs, Repton 40, Ravenskull, Recorder £510 o.n.o. Tel: 0384 279542.

● Novacad £35, Plotter drive £10, AMX design £25, boxed as new. Tel: 01 500 5701.

● Microvitec 452 medium res colour monitor £135 o.n.o. Tel: 0442 825972.

● BBC B, Acorn DFS, 40/80 double sided disc drive, joysticks, several excellent books, Elite £350 o.n.o. Tel: James 0732 366544 evenings. Quick sale wanted, offers?

● Music 500 plus symphony keyboard with discs and manuals £200 o.n.o. Tel: 0270 256224 after 6.30pm.

● BBC + extras, worth £1200, want £600 o.n.o. Tel: Luke 01 520 2853.

● Midwich 400k 40/80 track disc drive, perfect condition £150 o.n.o. Tel: 0442 52476.

● Silver Reed EXP500 daisy wheel printer £100. Tel: 01 460 1796 (Bromley).

● New apollo modem £60 plus 5 games (£5 each). Tel: 01 954 2189.

● Acorn Prestel adapter £50, Opus DDOS £25, Max rom £10, Oxford pascal, Lord of Rings, Graphic Adventure Creator, Audiogenic compilation, various children's software. Tel: (Hinckley) 0455 212283 for prices.

● Watford 32k shadow ram board £40, Watford rom board + 16k sideways ram £25, original packaging and documentation. New keyboard (BBC B) £30, Acorn Basic II rom £10, Advanced user guide £5. Upgraded to Master, hence sale. Tel: 01 380 9319 (days).

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● Acorn Z80 second processor £150 cost £329. Boxed unused, cass/recorder £20, Sanyo green hi res monitor £50. Tel: 01 680 8722 (evenings).

● BBC Master with Turbo 65C102 module, Microvitec 1451 monitor, Pace 40/80 double sided drive, reference manuals and software £500. Tel: 01 852 1631.

● BBC B 1.2 os ISS.4, Opus DDOS, 6502 2nd processor, two disc drives, View replay, ATPL, green monitor etc £550. Tel: Plymouth 666760.

● Opus 5¼in dual disc drive, unused £170 ono. Tel: 0493 664563.

● BBC B, DFS, sideways ram, 40 track double sided disc drive, high resolution colour monitor, plus joysticks, total value over £900, will accept £475 o.n.o. Tel: 01 692 1047.

● BBC model B os 1.2 sideways zif socket. Over 60 tapes (worth £200+ alone!). Ideal beginner's xmas gift £299. Tel: 0245 321709.

● BBC Master 128k brand new £385. Tel: 01 882 3248 (Rasik).

● BBC B+, 64k SWR Pascal, disc drive, data recorder, manuals £300 o.n.o. Tel: 0532 742053 (Julie) after 6pm.

● Penpals wanted. Write soon to Hickory Hill, Old Mont Cochon, St Helier, Jersey, C.I.

● Cumana CSX100 40T disc drive with PSU excellent condition £70 o.n.o. Tel: 031 553 3471 (evenings).

● Epson MX80F/T printer vgc £80 o.n.o. Cumana 40 track single sided disc drive £50 o.n.o. Tel: Immingham (0469) 77661.

● Basic editor rom £12, Spellcheck III rom £15, View printer driver tape £6, Master reference manual £9, Master/Electron cartridge £5, magazines, books etc. Tel: Edenbridge (0732) 862404.

● Z80 second processor c/w software & firmware. Offers? or would exchange for 6502 pattern. Tel: 0885 82980 (MAG-11655).

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Cheque enclosed for £______ (minimum £2 for 10 words)

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I certify that any software offered for sale is original and not a copy

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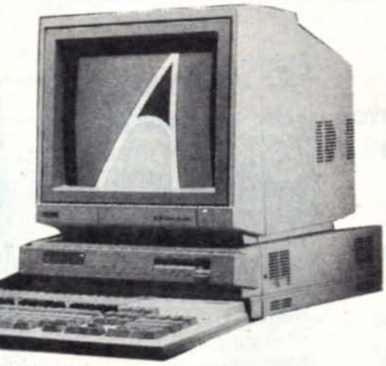

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(Please enquire about the availability of some of the above packages)

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ISO Pascal	£99 (c)
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Logistix	£99 (c)
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ARM Ass Lang Prog	£12.95 (d)

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All Compact Systems include a FREE educational/fun software bundle made up from BBC Publications software range.

SYSTEM 1 128K, Single 640K Drive & bundled software.	£319 (a)
SYSTEM 2 System 1 with a 12" Hi Res Monochrome Monitor.	£369 (a)
SYSTEM 3 System 1 with a 14" Med Res RGB Monitor.	£499 (a)
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Serial Kit.	£25 (c)
T.V. Modulator	£26 (d)
Extension cable for external 5.25" 80T Drive	£12.50 (d)
Mertec Adaptor (Upgrades to almost master level)	£35 (c)

FILE STORE

Acorn's new file server system Filestore E01	£828 (a)
Filestore E20	£710 (a)
Full details on request	
Acorn 30Mb Winchester (incl FS III Software)	£1530 (a)

ECONET ACCESSORIES

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Econet Socket Set	£29 (c)	Printer Server Rom	£41 (d)
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1.2 OS ROM	£15 (d)	ADFS ROM	£26 (d)
DNFS ROM	£19 (d)	1770 DFS Kit	£43.50 (d)
BASIC II ROM	£22.50 (d)	Econet Kit	£55 (d)

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Universal 2nd Processor Adaptor	£75 (b)
Acorn 65C02 Turbo	£99 (b)
ACORN 512 PROCESSOR	£189 (a)
MULTIFORM Z80 TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility	£249 (b)

ACW/CO-PROCESSOR

32016 Co-processor	£949 (a)
Cambridge Workstation	£3450 (a)
X25 Gateway	£2175 (b)
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ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. **£265 (a)**

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2764-25	£2.80 (d)
27128-25	£3.60 (d)
6264LP-15	£2.60 (d)
27256	£5.00 (d)
27512	£9.90 (d)

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ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS	£37 (c)
ATPL Battery backup kit	£18 (d)
ATPL Board for BBC+	£31 (c)

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AMCO6 Turbo 65C02 Module	£99 (b)
ADC08 512 Processor	£189 (b)
ADF14 ROM Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)
ADF10 Econet Module	£41(c)
ADJ24 Adv Ref Manual	£19.50(c)
ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)
BBC Master Dust Cover	£4.75(d)
Viewsheet User Guide	£8.50(d)

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TRC1 Two rom cartridge	£8.95 (d)
TRC4 Four rom cartridge	£11.95 (d)
TRC 32K Cartridge inc RAM	£29.95 (d)

LEARN ARABIC WITH YOUR COMPUTER

مساعد تعليم العربيه

Convert your BBC or Master computer to bilingual operation with the BABEL Arabic Package.

Beautiful Arabic text. Software developed and tested in the classroom for 2 years to help the young read and understand Arabic.

The package comprises: an easy to install EPROM, a set of keycap labels, an instruction booklet and a disc with absorbing programs: Mastering the Arabic alphabet, Arabic grammar exercisess, English to Arabic and Arabic to English translation exercises.

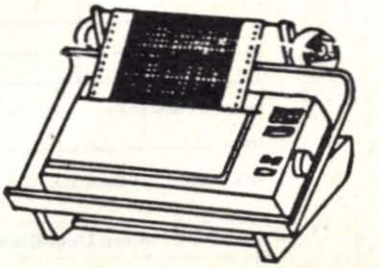
The BABEL Arabic Package	£70 (d)
Other Arabic educational software for the converted micro; each disc	£15 (d)

(Please specify 40 or 80 tracks). Send for more details.

Master Operating System (book by David Atherton) £12.95 (c)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



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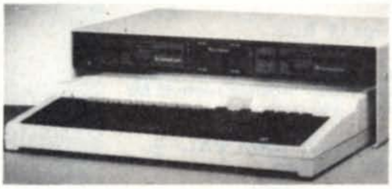
TECHNOMATIC DISC DRIVES

A range of high quality high performance drives to meet the needs of all BBC Micro Users.
All drives fitted with high quality, slim line Japanese drive mechanism and necessary cables.
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a two year warranty on these mechanisms without any extra charge.
*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.
*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.
*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

TS 400



PD 800P

5.25" Single Drives 40/80 switchable:

TS400 400K/640K	**£99 (b)**
PS400 400K/640K with integral mains power supply	**£109 (b)**

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PD800 800K/1280K with integral mains power supply	**£199 (a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£209 (a)**

3.5" 80T DS Drives:

TS351 single 400K/640K	**£75 (b)**
PS351 single 400K/640K with integral mains power supply	**£99 (b)**
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PD352 Dual 800K/1280K with integral mains power supply	**£169 (b)**
PD853 Combo Dual 5.25"/3.5" drive with psu.	**£209 (a)**

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(Suitable for DFS & ADFS)

TDM2 Dual Unit: 2 computers/one drive unit	**£69 (b)**
TDM4 Quad Unit: 4 computers/one drive unit	**£119 (b)**

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Technomatic offer the most popular range of Winchester Drives for BBC Micro Systems at competitive prices.

All Winchesters are supplied with:

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2. Front End Utility for the Master. This utility enables the total contents of the drive displayed in icon format indicating the type of data in each file. Any file can be loaded by pointing the cursor at it.

Enquire for larger capacity Winchesters.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£499 (a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£749 (a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£769 (a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1295 (a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£599 (a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£19 (d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering, otherwise the drive has to be returned to us for modification.
Adaptor for SJ FileServer **£28**

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These units let you share a Winchester drive between a number of computers. Full details on request.

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DB570 Lockable 70 x 5.25"	**£8.50 (c)**
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TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE

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PRINTERS

EPSON LX800	£180 (a)
EPSON FX800 An enhanced version of FX85. Call for details.	£299 (a)
EPSON FX1000 An enhanced version of FX105. Call for details.	£405 (a)
EPSON EX800	£409 (a)
EPSON EX1000	£549 (a)
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EPSON LQ800	£399 (a)
EPSON LQ1000 As LQ800 but wider carriage for 136 columns.	£529 (a)
TAXAN KP815 Enhanced KP810 with 160cps and full IBM compatibility.	£269 (a)
TAXAN KP915 Enhanced KP910 with 180cps and full IBM compatibility.	£369 (a)
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STAR NL 10 (Parallel Interface)	£190 (a)
STAR NL 10 (Serial Interface)	£219 (a)
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BROTHER HR20 8K buffer standard expandable to 16K. Parallel & Serial ports as standard.	£349 (a)
NAT PANASONIC KX P3131 Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface	£249 (a)
JUKI 6100 Daisy wheel printer 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface.	£295 (a)
Parallel Printer Lead (1.2m)	£5 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

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MIRACLE WS3000 V21/23	£244 (b)
MIRACLE WS3000 V22	£409 (b)
MIRACLE WS3000 V22 bis (All modems are BABT approved)	£537 (b)
BBC Data Cable for WS3000/4000	£7 (d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)
WS2000 Auto Dial Card	£27 (d)
WS2000 Auto Answer Card	£27 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 User Port Lead	£5 (d)

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Plotmate A4S	£282 (a)
Plotmate A3M	£431 (a)

Larger Plotters available. Please enquire.

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BUFFALO PB Buffer Parallel buffer for internal fitting to most Epson printers. Simple to instal. **PB128** (128K)	£89 (c)

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3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
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BBC Cable set 3 to 1 (1m ea)	£24(c)		
BBC Cable set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26 1 computer to 2 printers fitted with BBC cable	£17 (c)

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Single Row 3½ × 1 7/16"	£5 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

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Compatible with B, B+ and Master

EpromRyter (Epromer II) Eprom Ryter is compatible with BBC Master only. See page 7.	£119 (b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II)	£49 (b)
EPROMER II	£89 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 512K	£245(b)
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EPROM ERASERS

UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

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BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	£179 (a)
Microvitec 1431AP As 1431 + composite video and sound input	£199 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£255 (a)
Microvitec 1441 High Resolution 895 pixels	£359 (a)
Philips 14" RGB Med Res, high contrast screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Seperate controls for brillance and contrast.	£195 (a)

Microvitec 20" RGB/PAL/Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269 (a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319 (a)

12" MONOCHROME MONITORS

TAXAN KX 117 Hi Res green etched screen	£85 (a)
TAXAN KX 118 Hi Res Long Persistence (P39)	£90 (a)
TAXAN KX 119 Hi Res amber etched screen	£90 (a)
PHILIPS BM 7502 Hi Res green screen.	£69 (a)
PHILIPS BM7522 Hi Res amber screen.	£75 (a)
PHILIPS BM 7542 Hi Res White screen.	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17 (c)
Philips Swivel Base	£10 (c)
Monitor Stand Models B & B+	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B+ or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

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NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	**£49 (d)**
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TM Version plus Mouse	**£79 (d)**
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Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** *comment on their use with other DFS systems.*

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For B & B+ 40T or 80T	**£14.75 (d)**
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For Compact	**£19 (d)**
MINI OFFICE II ROM Version For Master, Compact, B+ & B	**£48 (c)**

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BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

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S.T.:POLYMERS	**Disc/EC£19 (d)**
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BATTLEFIELDS	**Cass£8.50 (d)**
A VOUS LA FRANCE	**Cass/EC£17 (d)**
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	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	**£9.00 (d)**
DEUTSCH DIREKT	**Disc/aud/EC£16 (c)**
	Book£5.95 (d)
MODEM MASTER	**£11 (d)**

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

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No VAT Carriage Code (c)

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6502 Programming	£13.95
8086 Book	£23.95
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Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95

BBC MICRO GUIDE BOOKS	
Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95

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Advanced Sideways Ram User Guide	£9.95
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Applied Assembly Language on the BBC	£9.95
BBC Micro Advance Programming	£9.95
BBC Micro Ref Guide (B Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
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Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

Mastering Operating System
(David Atherton) £12.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact
6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d)
instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25'' disc for BBC Master, B+ and B and on a 3.5'' disc for the Compact.

5.25'' Disc	**£17.50(d)**
3.5'' Disc	**£18.50(d)**

(Normal RRP over £40)

PRINTER ACCESSORIES

EPSON ACCESSORIES:	
Interfaces	
8143 RS232	**£30 (d)**
8148 + RS232 + 8k	**£65 (d)**
8177P NLQ for FX80 +/FX100 +	**£99 (d)**
Parallel & Serial Buffers of various size also available.	
LQ800 Tractor Feed	**£47 (b)**
LQ1000 Tractor Feed	**£52 (b)**
SHEET FEEDERS:	
LQ800	**£135 (b)**
LQ1000	**£179 (b)**
EX800	**£135 (b)**
EX1000	**£309 (b)**
FX800	**£135 (b)**
FX1000	**£179 (b)**
Ribbons:	
RX/FX100/100 +, FX105	**£7 (d)**
RX/FX80/80 +, FX85	**£4 (d)**
LX80/LX800	**£4.50 (d)**
LQ800	**£8.50 (d)**
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EX800/1000	**£7.50 (d)**
H180 Pen Set (Aqueous/Ball point)	**£8.25 (d)**
HITACHI 672 Plotter	
Aqueous Pen Set six pens	**£18.50 (d)**
Oil Based Pen Set six pens	**£25.00 (d)**
TAXAN CANON Accessories:	
Ribbon, KP810/815/910/915	**£6 (d)**
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NL10 Sheet Feeder	**£52 (b)**
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Spare Ribbon	**£4.50 (d)**
KXP3131 Tractor	**£90 (a)**
KXP3131 Sheet Feeder	**£189 (a)**
JUKI 6100	
Tractor Feed	**£149 (a)**
Ribbon (Carbon)	**£2.00 (d)**
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BROTHER HR20	
Tractor Feed	**£116 (a)**
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Spare Ink Cartridge Black	**£9 (d)**
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4 hr viewdata system)
el:01-450 9764

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NOVACAD

Computer Aided Draughting for the BBC Micro

> *Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use.* **Beebug December 1986**

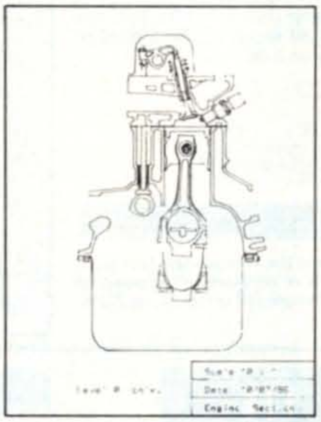
> *Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market".* **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

NOVACAD'S MAJOR FEATURES

- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique optional facility to output to any BBC compatible plotter.
- Cursor control from keyboard, tracker ball or mouse.



NEW REDUCED PRICE

£49(d)

Plotter Driver Generator £15(d)

NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC + or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

BBC SPARE PARTS

BBC B & General

Power Supply	**£52.00 (b)**
Keyboard Connector	**£5.00 (d)**
Complete Keyboard	**£52.00 (b)**
Keyswitch (state type)	**£1.75 (d)**
Modulator UM1233	**£4.80 (d)**
Video ULA	**£18.00 (d)**
Serial ULA	**£14.00 (d)**
1.2 OS	**£15.00 (d)**
BASIC II ROM	**£22.00 (d)**
DNFS ROM	**£17.50 (d)**
ADFS ROM	**£26.00 (d)**
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6522A	**£5.50 (d)**
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LM324	**£0.45 (d)**
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UPD7002	**£7.00 (d)**
NE555	**£0.50 (d)**
68B50	**£2.50 (d)**
74ALS245	**£5.00 (d)**
WD1770	**£24.00 (d)**
68B54	**£8.00 (d)**
75159	**£2.20 (d)**
76489	**£4.00 (d)**

BBC B +

Keyswitch (state type)	**£1.75 (d)**
Modulator UM1233	**£4.80 (d)**
B+ OS	**£18.00 (d)**
4864-12	**£3.00 (d)**
PAL16RH	**£18.00 (d)**
1770 DFS ROM	**£17.50 (d)**

BBC MASTER

Power Supply	**£65.00 (b)**
Keyboard Connection	**£3.75 (d)**
Keyboard	**£65.00 (b)**
Keyswitch (state type)	**£1.75 (d)**
1 Mb OS ROM	**£39.00 (d)**
CF30060 ULA	**£10.00 (d)**
CF30047 ULA	**£15.25 (d)**
CF30048 ULA	**£15.25 (d)**
CF30049 ULA	**£15.25 (d)**
CF30050 ULA	**£19.75 (d)**
CF30058 ULA	**£15.00 (d)**
6818	**£4.00 (d)**
65SC12	**£15.66 (d)**
50464	**£3.50 (d)**
74F00	**£1.00 (d)**
74F74	**£1.40 (d)**
74HCT253	**£3.50 (d)**
9637	**£2.00 (d)**
32.768 MHz Xtal	**£2.00 (d)**

2nd PROCESSORS

ULA (512)	**£34.00 (d)**
ULA (6502 & Z80)	**£28.00 (d)**
Power Supply	**£42.00 (b)**

TECHNOMATIC

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EpromRyter

***Highly sophisticated & Advanced Programmer**

***Handles all current 1 rail Eproms**

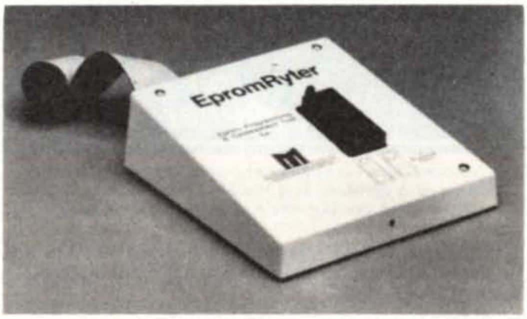
***State of the Art Programming Algorithms**

EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1 MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
● 2716 2732 2764 27128 27256 27512 27513 27011
2516 2532 2564 (NMOS & CMOS)
● One time eproms P27XXX, 87CXXX etc.
● Also A suffix eproms such as 27XXXA



The main features of the programming software are:

- * Device, function and voltage selection from the computer keyboard.
- * Continuous display of the options selected.
- * All eproms upto 27512 (64K) programmed in single pass.
- * Automatic Intelligent identifier support for eproms able to respond.
- * Selectable programming voltage 25/21/12.5V
- * 3 programming methods: Normal, Intelligent & Pulse (30 sec for a 27128).
- * Serial port protocols supported incl Intel Hex & Motorola S.
- * DFS, NFS, ADFS and Rom Filing System Supported.
- * BASIC/Machine Code programming using RFS.
- * Powerful editor with input in HEX or ASCII. * Full editable 64K file.
- * Block move of data within the address range.
- * User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- * Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."

Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
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Mike Cook shows how to free yourself from the standard monitor

SERIES

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Linking your BBC to an LCD screen

THE BEEB BODY BUILDING COURSE

LAST month we saw how to tap into liquid crystal display devices in order to read what they are saying. Well this month the boot is on the other foot and we'll use an LCD in place of the monitor. This gives a compact display and if you are running off batteries, a liquid crystal display will cut down on power consumption.

A number of liquid crystal display modules are available from Hitachi and these make adding an alternative display to your micro a much less daunting proposition than it otherwise would be.

If you remember, last month we saw the sorts of waveforms needed to drive a single seven segment display. They were pretty horrendous. In order to show alphanumeric information you need a dot matrix display of at least 35 individual LCD dots for each character you display.

Hitachi makes an LCD controller which will handle 560 dot waveforms at a time. However you will see that this is only enough to show 16 characters. Each controller is a microprocessor in its own right and fortunately they have been designed to be easily cascaded in order to share the running of a large display.

Various display configurations are available from one line of eight characters to four lines of 40 characters. Perhaps the minimum display required for use on a BBC Micro would be provided by the LM018L, having two lines of 40 characters.

This has five LCD controllers chained together to drive the 2,800 individual dots. The module requires a simple 5 volt power supply and can be talked to using an 8 or 4 bit bus.

It appears to be two read/write registers and could be attached to the 1MHz bus, but by utilising its 4 bit bus mode, we can squeeze it on to the user port. This makes the interfacing much easier and cheaper.

So four bits of the user port will transfer data to the LCD, with three bits determining read/write, register select and enable line. The full circuit is shown in Figure I.

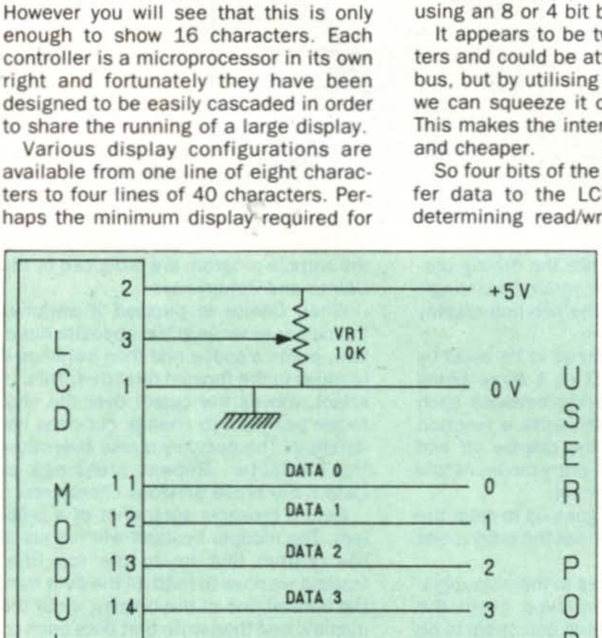

Figure I: LCD module interface

The liquid crystal back plane needs a voltage that will vary with temperature and the required contrast ratio, so this is supplied from a variable resistor.

As you can see, the basic problem is one of getting the right wires to the right place. The LCD module has 14 holes arranged as shown in Figure II. I found the best way to use these was to solder on two rows of 0.1 inch pitch pins. Then I could make a transition board between the appropriate socket and a standard body build cable.

By using a 90 degree header plug, the board could be made single sided and flush with the back of the module.

I made the prototype using square pad veroboard but have now made a printed circuit layout which is available along with the variable resistor, plugs and sockets as Body Build Pack No.45. Note that you will also need a cable (Pack No.2) as well as the LCD module.

Having built the interface how do we talk to the LCD module? Well, information is transferred four bits at a time on the falling edge of the E signal. So, quite simply, we place the data we want to transfer along with a high E line on to the user port and then drop the E line without altering the data.

The R/W line tells the module if it should be sending or receiving data and the RS line tells it which register we want to access. The four most significant bits are transferred first, followed by the four least significant bits.

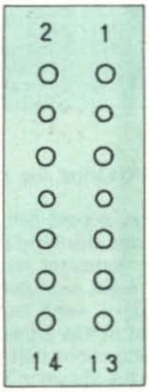

Figure II: LCD module connectors at wiring side

The LCD module has two registers: A control register indicated by RS being zero and a data register indicated by RS being one.

As you might imagine, anything you want to display is written into the data register with the control register determining the way the display

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Instruction	Code										Description
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
Clear display	0	0	0	0	0	0	0	0	0	1	Clears all display and returns the cursor to the home position (address 0).
Return home	0	0	0	0	0	0	0	0	1	*	Returns the cursor to the home position (address 0). Also returns the display being shifted to the original position. DD ram contents remain unchanged.
Entry mode set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and specifies or not to shift the display. These operations are performed during data write and read.
Display on/off control	0	0	0	0	0	0	1	D	C	B	Sets on/off of all display (D), cursor on/off (C), and blink of cursor position character (B).
Cursor and display shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing DD ram contents
Function set	0	0	0	0	1	DL	N	F	*	*	Sets interface data length (DL) number of display lines (L) and character font (F).
Set CG ram address	0	0	0	1	ACG						Sets the CG ram address. CG ram data is sent and received after this setting.
Set DD ram address	0	0	1	ADD							Sets the DD ram address. DD ram data is sent and received after this setting.
Read busy flag & address	0	1	BF	AC							Reads Busy flag (BF) indicating internal operation is being performed and reads address counter contents.
Write data to CG or DD ram	1	0	Write data								Writes data into DD ram or CG ram.
Read data to CG or DD ram	1	1	Read data								Reads data from DD ram or CG ram.
* No effect	I/D =1: Increment (+1) I/D = 0: Decrement (−1) S =1: Accompanies display shift. S/C =1: Display shift S/C = 0: Cursor move R/L =1: Shift to the right R/L =0: Shift to the left DL =1: 8 bits DL = 0: 4 bits N =1: 2 lines N = 0: 1 line F =1: 5 x 10 dots F = 0: 5 x 7 dots BF =1: Internally operating BF =0: Can accept instruction										DD RAM: Display data ram CG RAM: Character generator ram ACG: CG ram address ADD: DD ram address Corresponds to cursor address. AC: Address counter used for both of DD and CG ram address.

Table I: Instructions which can be sent to the LCD

◀ *From Page 99*

behaves, such as clearing the display and type of cursor.

You can, however, access two different data spaces – the display data ram and the character generator ram. The latter allows you eight user-definable characters, although I won't be going into how to use that in this article.

The full list of instructions that can be sent to the module are shown in Table I. The display can be made to shift automatically to give a character scrolling effect but I will concentrate on how to make it behave as much like the BBC Micro's screen as possible.

Because the LCD module is a microprocessor it takes a little time to obey the different instructions. Before sending it another instruction you should check that it is ready. This is given by a flag in the most significant bit of the display data address.

However, as the longest instruction takes about 2mS, we needn't bother with this as long as we write the driving program in Basic. The program in Listing I shows how to drive the two-line display from a Basic program.

First the system needs to be reset by writing the number 3 at it three times with at least 5mS delay between each successive write. Then write a function set command, turn the display off and on and finally set the entry mode. At this point the display is reset.

The program then goes on to clear the display, turn it on and set the entry mode we really want.

If we now send bytes to the data register they will be displayed as in the welcome string. It would now seem to be simply a matter of reading keys from the keyboard and sending them to the display. Unfortunately it is not quite as simple as that because all we have is a simple display device which knows nothing of control codes. So we need to implement any control code we want to have any effect. The two implemented in the sample program are produced by the Delete and Return keys.

When Delete is pressed it switches the cursor to move in the opposite direction, prints a space and then switches it to move in the forward direction. This, in effect, moves the cursor over the character you want to change but does not delete it. The next key stroke overwrites the character. Repeat pressings of Delete will erase previous characters.

Return presents somewhat of a problem. The module by itself will not scroll the bottom line up to the top line. Instead we have to read all the data from the bottom line of the display, clear the display, and then write that data back on the top line.

As you can appreciate, this takes a little time in Basic – just over two seconds. Also if we write past the end of the second line the module will carry on writing back on the top line, so, after each character is written, we must test

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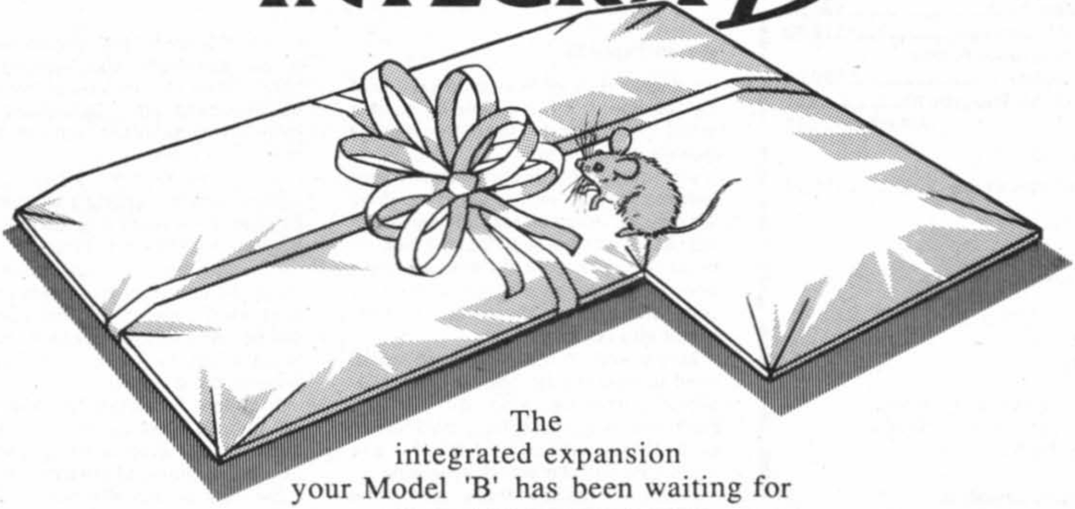
INTEGRA-B



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◀ *From Page 100*

the display data address to see if it is at the top line. If it is we need to insert a scroll command to keep the display looking conventional.

We can now incorporate these routines into our own programs to drive the display. However it would be useful if the LCD could take over from the monitor in all it displays. To do this we would need to rewrite the program in machine code and redirect the write character vector into our routine.

At the end of the routine we would need to re-enter the original write character procedure. Also, all the VDU command sequences for graphics and so on would need to be filtered out to avoid spurious characters appearing.

Finally, to make it really useful, the whole program really needs to be put in a sideways rom. Unfortunately I do not have the space to print such a large program here but I have written it and it is available ready blown on to an eprom. Details are given on the pack ordering form.

One of the problems with a liquid crystal display is that it does not show up so well under poor lighting conditions. There is a version of the module that is back lit with LEDs allowing it to be more easily seen but, unfortunately, it costs a lot more.

A two-line display is the minimum requirement and writing a program is not so easy. Even doing a catalogue of your disc will not show any files.

However there is a way to see them: Press the up cursor four times and then hold down Copy. In fact the cursor key can be used to copy any area of screen to allow you to see it – not very convenient, but possible.

The more expensive four-line display will help to some extent, but I see the liquid crystal display being used with existing programs where a monitor is not convenient or cost-effective.

So there you have it. You can free yourself of the burden of a monitor, for about the same price as a monochrome monitor and for field work or environments that are not suited to a monitor it is an alternative well worth looking at.

Have a Merry Christmas. I'll see you next month.

```
   10 PRINT"Beeb Body Building Course De
c. 1987"
   20 PRINT"LIQUID CRYSTAL DISPLAY DRIVE
R"
   30 PRINT"2 LINES 40 CHARACTERS"
   40 PRINT"By Mike Cook"
   50 PRINT:PRINT"NOW TYPE"
   60 DIM S%(39)
   70 ?&FE60=0:?&FE62=&7F
   80 REM FIRST RESET THE SYSTEM
   90 FOR A%=1 TO 3
  100 PROC_POKE(3)
  110 FOR B=0 TO 100:NEXT
  120 NEXT
  130 FOR A=1 TO 7
  140 READ B%
  150 PROC_P_POKE(B%)
  160 NEXT
  170 REM INITILISATION DATA
  180 DATA 2,&28,8,1,&28,&E,6
  190 PROC_D_STRING("Welcome to the worl
d of liquid crystal")
  200 PROC_P_POKE(&C0):REM SECOND LINE
  210 RS%=0
  220 REPEAT
  230 A$=GET$
  240 IF A$=CHR$(127) THEN PROC_BS:GOTO
230
  250 IF A$=CHR$(13) THEN PROC_SCROLE:GO
TO 230
  260 PROC_D_POKE(ASC(A$))
  270 IF FN_READ=0 THEN PROC_SCROLE
  280 UNTIL FALSE
  290 END
  300 DEF PROC_P_POKE(A%)
  310 PROC_POKE(A% DIV 16)
  320 PROC_POKE(A% AND 15)
  330 ENDPROC
  340 DEF PROC_POKE(A%)
  350 ?&FE60=A% OR &40
  360 ?&FE60=A%
  370 ENDPROC
  380 DEF PROC_D_POKE(A%)
  390 PROC_POKE((A% DIV 16) OR &10)
  400 PROC_POKE((A% AND 15) OR &10)
  410 ENDPROC
  420 DEF FN_READ
  430 ?&FE62=&70
  440 ?&FE60=&20 OR RS%
  450 ?&FE60=&60 OR RS%
  460 AH%=?&FE60 AND 7
  470 ?&FE60=&20 OR RS%
  480 ?&FE60=&60 OR RS%
  490 AL%=?&FE60 AND 15
  500 ?&FE60=0
  510 ?&FE62=&7F
  520 =AH%*16+AL%
  530 DEF PROC_BS
  540 PROC_P_POKE(4):REM SET BACKWARDS M
OVING CURSOR
  550 PROC_D_POKE(&20):REM PRINT A SPACE
  560 PROC_P_POKE(6):REM SET FORWARDS MO
VING CURSOR
  570 ENDPROC
  580 DEF PROC_SCROLE
  590 RS%=0
  600 P%=FN_READ
  610 IF P%=0 THEN 630
  620 IF P%<40 THEN PROC_P_POKE(&C0):END
PROC
  630 PROC_P_POKE(&C0):REM TO START OF L
INE 2
  640 PROC_P_POKE(&A):REM BLANK DISPLAY
  650 RS%=&10
  660 FOR A%=0 TO 39
  670 S%(A%)=FN_READ
  680 NEXT
  690 PROC_P_POKE(1):REM CLEAR AND HOME
DISPLAY
  700 PROC_P_POKE(&E):REM DISPLAY ON
  710 FOR A%=0 TO 39
  720 PROC_D_POKE(S%(A%))
  730 NEXT
  740 PROC_P_POKE(&C0):REM TO START OF L
INE 2
  750 RS%=0
  760 ENDPROC
  770 DEF PROC_D_STRING(M$)
  780 FOR A%=1 TO LEN(M$)
  790 PROC_D_POKE(ASC(MID$(M$,A%,1)))
  800 NEXT
  810 ENDPROC
```

Get it right!

```
 10 = AD4E E | 280 = 226C 6 | 550 = 614F 3
 20 = 1D33 3 | 290 = FD2E 3 | 560 = 29DC 4
 30 = 2A42 4 | 300 = E98A 7 | 570 = ED0F 8
 40 = FC23 E | 310 = 700E A | 580 = 37EB C
 50 = AF43 A | 320 = 8F0C 9 | 590 = 97FA B
 60 = 77AB B | 330 = ED0F E | 600 = 4387 A
 70 = 9063 F | 340 = 5D2A 4 | 610 = 36E3 F
 80 =    0 F | 350 = D101 2 | 620 = 72D1 2
 90 = B8F4 1 | 360 = E261 9 | 630 = 6F0A 6
100 = 6088 D | 370 = ED0F C | 640 = 811F 8
110 = F04E 3 | 380 = D029 2 | 650 = 3E1D F
120 = 2C83 E | 390 = DFB7 F | 660 = 3009 4
130 = 9304 E | 400 = F186 4 | 670 = 784C C
140 = 9D3E B | 410 = ED0F 9 | 680 = 2C83 F
150 = 4A2B 6 | 420 = C186 0 | 690 = AC4C D
160 = 2C83 3 | 430 = B556 F | 700 = 5DDF 3
170 =    0 3 | 440 = 3E02 3 | 710 = 3009 B
180 = 6806 3 | 450 = 316F 7 | 720 = 1232 8
190 = 2E5A 3 | 460 = 8359 A | 730 = 2C83 4
200 = 6F0A A | 470 = 3E02 9 | 740 = 6F0A B
210 = 97FA 4 | 480 = 316F 2 | 750 = 97FA F
220 = BFBA D | 490 = C91E 3 | 760 = ED0F 6
230 = 77F2 E | 500 =  E4C 5 | 770 = 6E08 9
240 = 1DC5 3 | 510 = AB07 E | 780 = B9BC 4
250 = C0D9 6 | 520 = 853D 3 | 790 = E142 E
260 = 5A84 6 | 530 = E3A1 4 | 800 = 2C83 5
270 = C1A1 8 | 540 = 47BC D | 810 = ED0F 6
```

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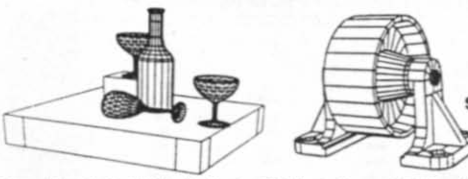

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Feature	ADE +	BBC Basic	MACROM
Number of pseudo-ops	64	4	36
Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
String functions	Yes	Yes	No
True macro libraries	Yes	No	No
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Use any editor?	Yes	No	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C12 only	65C12 only
Switch off 65C12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Symbolic	No	Simple
Label restrictions	No	Yes	Yes

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SYSTEM

The key to expansion

The function keys are really at your fingertips with John Rawlinson's easy-to-use routine

ONE of the features of the BBC Micro that first impresses you is the row of function keys. These, you imagine, can be programmed with all sorts of useful strings to save typing.

However, after a while two things happen – all the function keys get used up with your favourite settings, and you discover that once you set a function key you have to remember what you set it to.

In fact a different feature is almost as much use as the function keys – keywords can be abbreviated. So typing L. is equivalent to typing LIST.

The advantage of these abbreviations, over the function keys, is that they act as mnemonics, so you can guess from L. that it might be equivalent to LIST, while f0 could do anything. So it would be rather nice to be able to define your own abbreviations – and this is just what Macromate allows you to do.

Macromate is loaded into sideways ram. It cannot be blown as a rom, because it uses the ram for storing things.

With the program loaded into your machine, you have five new star commands. The most important of these, is *MAC, which allows you to define up to 48 keyboard macros. The syntax is as follows:

```
*MAC [0..47] "str1" "str2"
```

The number is the macro number, just like the number in the *KEY command. Once the macro is defined every time *str1* is typed, it will have *str2* appended to it – the last character of *str1* is replaced by *str2*.

Each macro definition can be up to 256 bytes long. The L. abbreviation could be simulated like this:

```
*MAC 0 "L." "IST"
```

After issuing this command, each time the "." of L. is typed, IST will be added instead.

Another valuable effect is that you get an extra 20 function keys, each of which can be around 256 bytes in length. This is because the function keys in combination with Shift and Control produce the characters 128 to 137 and 144 to 154 and you can define macros for these characters.

To do this, it is necessary to remember how to enter non-printable characters into *KEY definitions.

Briefly, control codes can be included by preceding the appropriate character with a bar, |@ = CHR$(0), |A = CHR$(1) and so on.

Characters in the range 128 to 255 are entered by preceding the corresponding character in the range 0 to 127 with |!. So suppose you want to make the keys Shift+f0 produce the string "MODE7"+Return then all that is needed is the macro:

```
*MAC0 "|!|@" "MODE7|M"
```

Although these extra function keys are very useful, the really handy bit of Macromate is its ability to define more complex expansions. For example, if you would like to type YF at the end of a letter instead of "Yours faithfully,", just set up this definition:

```
*MAC1 "YF" "ours faithfully,"
```

The next stage is to completely replace the first string with the second: For example, you might want to define I. as "*INFO *"+Return. In fact, this can be got around like this:

```
*MAC2 "I." "|?*INFO *|M"
```

This works because |? represents the delete character which will delete the *I* already present in the input text.

Finally, one amusing example. How many times have you typed *> instead of *. when trying to *CAT a disc? People have proposed other solutions to this, but by making the definition:

```
*MAC3 "*>" "."
```

the *> error can be a thing of the past.

You can omit the quotes around the strings in a *MAC command if the strings do not contain any spaces, for example:

```
*MAC32 R. UN
```

Macromate provides several other commands to help you.

***MACTYPE [0..47]** will print out a macro definition in a form suitable for editing.

***MACOFF** will switch off macro expansion. It is useful to be able to do this while definitions are edited otherwise you'll get expansions occurring while you're trying to redefine them.

***MACON** switches on macro expansion.

***MACSAVE** will save the Macromate ram in a file called Macram complete with any definitions you have made so that you can reload the whole rom image with your favourite key expansions.

To set up Macromate, type in the accompanying listing and remove any

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◀ *From Page 105*

typing errors using the checksums. When run, a copy of Macromate is saved in a file called Macram.

What you do with it depends on what sort of sideways ram you have in your machine. If you have ram of the type where all writes to memory between &8000 and &C000 are automatically made to ram, you can install Macromate by typing *RUN Macram or just *Macram.

Where banks of ram can be written to individually you will have to type *SRLOAD Macram and so on, or whatever command you use and then press Break (or Control+Break on the Master).

Now you're set to start defining your MACs. So go to it.

```
  100 REM Macromate
  110 REM by J. Rawlinson
  120 REM (c) The Micro User
  130 DIM C% 2000:PROCsetup
  140 FOR I%=4 TO 6 STEP 2
  150 P%=&8000:O%=C%:PROCasm:NEXT
  160 PROCcli("SAVE MACRAM "+STR$~C%+"+4
000 "+STR$~(!-4AND&FFFF)+" 8000")
  170 END
  180 DEF PROCsetup
  190 GSR=&FFC5:WA=&FFEE:BY=&FFF4
  200 FI=&FFCE:BP=&FFD4:FL=&FFDD
  210 R1L=&70:R1H=&71:R2L=&72:R2H=&73
  220 R3L=&74:R3H=&75:SL=&76:SH=&77
  230 RL=&78:RH=&79:XL=&7A:XH=&7B
  240 ZL=&7C:ZH=&7D:AC=&7E
  250 AL=&7F:AH=&80:BL=&81:BH=&82
  260 ENDPROC
  270 DEF PROCasm:[OPT I%
  280  BRK:BRK:BRK:JMP sentry
  290  EQUB 130:EQUB cccr MOD 256
  300  EQUB 1:EQUS "MACROMATE"
  310  EQUB 0:EQUS "1.00"
  320 .cccr
  330  EQUB 0:EQUS "(C) The Micro User"
  340  EQUB 0:EQUW 0
  350 .sentry PHP
  360  CMP#&27:BEQ sabbo
  370  CMP#3:BEQ sabbo
  380  CMP#2:BEQ sprv
  390  CMP#4:BEQ oscli
  400 .sent1 PLP:RTS
  410 .sprv PHA:LDA#0:STA &DF0,X
  420  PLA:JMP sent1
  430 .sabbo
  440  JSR oswop:PHA:TYA:PHA:TXA:PHA
  450  BIT isclr:BPL sab2
  460  LDA#&90:STA R1H:LDA#0:STA R1L
  470  STA isclr:LDX#&30:TAY
  480 .sable STA (R1L),Y:INY:BNE sable
  490  INC R1H:DEX:BNE sable
  500 .sab2 LDA &210:STA oremv+1
  510  LDA &211:STA oremv+2
  520  LDA#&FF:STA &211
  530  LDA#&18:STA &210
  540  LDA#&A8:LDX#0:LDY#&FF
  550  JSR BY:STX R1L:STY R1H
  560  CLC:LDA#&18:ADC R1L:STA R1L
  570  LDA#0:ADC R1H:STA R1H:LDY#0
  580  LDA#remv MOD 256:STA (R1L),Y
  590  INY:LDA#remv DIV 256:STA (R1L),Y
  600  INY:LDA&F4:STA (R1L),Y
  610  PLA:TAX:PLA:TAY
  620  PLA:JSR oswop:JMP sent1
  630 .isclr EQUB 255
  640 .oscli JSR oswop:TXA:PHA:TYA:PHA
  650  LDA &F2:STA SL:LDA &F3:STA SH
  660  JMP osct
  670 .oscs INY
  680 .osct LDA (SL),Y
  690  CMP#ASC"*":BEQ oscs
  700  CMP#ASC" ":BEQ oscs
  710  JSR gkwd:BCS oscx
  720  TAX:DEY:LDA(SL),Y:INY
  730  CMP#ASC".":BEQ oscok:LDA(SL),Y
  740  JSR isal:BCS oscok
  750 .oscx PLA:TAY:PLA:TAX
  760  JSR oswop:LDA#4:JMP sent1
  770 .oscok STX R1H:STY R1L
  780  LDA &F2:STA SL:LDA &F3:STA SH
  790  LDA R1H:LDY#0:ASL A
  800  CLC:ADC#jtab MOD256:STA RL
  810  LDA#0:ADC#jtab DIV256:STA RH
  820  LDA#(oscrt-1)DIV 256:PHA
  830  LDA#(oscrt-1)MOD 256:PHA
  840  LDA (RL),Y:SEC:SBC#1:TAX:INY
  850  LDA (RL),Y:SBC#0
  860  PHA:TXA:PHA:LDY R1L:RTS
  870 .oscrt PLA:TAY:PLA:TAX
  880  JSR oswop:LDA#0:JMP sent1
  890 .jtab EQUW macon:EQUW macoff
  900  EQUW macsave:EQUW mactype
  910  EQUW macdef
  920 .comtab
  930  EQUS "MACO":EQUB ASC"N"+128
  940  EQUS "MACOF":EQUB ASC"F"+128
  950  EQUS "MACSAV":EQUB ASC"E"+128
  960  EQUS "MACTYP":EQUB ASC"E"+128
  970  EQUS "MA":EQUB ASC"C"+128
  980  EQUB 0
  990 .gkst2 INY
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
 1000 .gkst LDA (SL),Y:CMP#32:BEQ gkst2
 1010  CMP#ASC",":BEQ gkst2:CMP#13:RTS
 1020 .gkwd LDA#comtab MOD 256:STA XL
 1030  LDA#comtab DIV 256:STA XH
 1040  STY RL:LDX#0:STX RH
 1050 .gkol LDY RL
 1060 .gkil LDA (SL),Y:CMP#ASC"."
 1070  BEQ gkfx:JSR uc:JSR isal
 1080  BCC gkwn:JSR isnu:BCS gknx
 1090 .gkwn EOR (XL,X):AND#127:BNE gknx
 1100  INY:JSR gkir:BMI gkfo:BPL gkil
 1110 .gkir LDA (XL,X):PHP
 1120  INC XL:BNE gki2:INC XH
 1130 .gki2 PLP:RTS
 1140 .gknx JSR gkir:BPL gknx
 1150  INC RH:LDA(XL,X):BNE gkol
 1160 .gkff SEC:LDY RL:RTS
 1170 .gkfx TYA:SEC:SBC RL
 1180  CMP#3:BCC gkff:INY
 1190 .gkfo LDA RH:CLC:RTS
 1200 .ison EQUB 255
 1210 .macon LDA#255:STA ison:RTS
 1220 .macoff LDA#0:STA ison:RTS
 1230 .macdef JSR dtbp
 1240  LDA R1L:CMP#48:BCS macd2
 1250  CLC:ADC#&90:STA R3H
 1260  LDA#0:STA R3L:JSR macr
 1270 .macr JSR GSC:BEQ macr2
 1280 .macr3 JSR GSR:BCS macr2:LDX#0
 1290  STA (R3L,X):INC R3L:JMP macr3
 1300 .macr2 LDA#0:STA (R3L,X):INC R3L
 1310 .macd2 RTS
 1320 .GSI CLC:LDA SL:STA &F2:LDA SH
 1330  STA &F3:JMP&FFC2
 1340 .GSC TYA:PHA:JSR GSI
 1350 .GSC2 JSR GSR:BCC GSC2
 1360  PLA:TAY:JMP GSI
 1370 .macsave LDX#0
 1380 .macs LDA macram,X:STA &C00,X
 1390  INX:CPX#22:BNE macs
 1400  LDX#0:LDY#&C:LDA#&80
 1410  JSR FI:TAY:LDA#0
 1420  TAX:STA R1L:LDA#&80:STA R1H
 1430 .macs2 LDA (R1L,X):JSR BP
 1440  INC R1L:BNE macs2
 1450  INC R1H:LDA R1H:CMP#&C0
 1460  BNE macs2:LDA#0:JSR FI
 1470  LDX#7:LDY#&C:LDA#1:JMP FL
 1480 .macram EQUS"MACRAM":EQUB13
 1490 .pablk EQUW &C00
 1500  EQUW &8000:EQUW &FFFF
 1510  EQUW !-4:EQUW &FFFF
 1520  EQUW 0:EQUW 0:EQUW 0:EQUW 0
 1530 .mactype JSR dtbp
 1540  LDA R1L:CMP#48:BCC mact3:RTS
 1550 .mact3
 1560  TAX:CLC:ADC#&90:STA SH:JSR prs
 1570  EQUS" *MAC "":TXA:JSR adc
 1580  JSR spc:LDY#0:STY SL:JSR macp
 1590  JSR spc:JSR macp:JMP crlnf
 1600 .macp JSR quote
 1610 .macp2
 1620  LDA (SL),Y:INY:TAX:BEQ quote
 1630  PHA:JSR decru:PLA:BNE macp2
 1640 .quote JSR prs:EQUB34:EQUS"^":RTS
 1650 .decru CMP#128:BCC decr2:JSR decrb
 1660  PHA:LDA#ASC"!":JSR WR:PLA
 1670  AND#127
 1680 .decr2 CMP#124:BEQ decr0
 1690  CMP#127:BNE decr1
 1700  LDA#ASC"?":BNE decr0
 1710 .decr1 CMP#34:BNE decr4
 1720 .decr0 JSR decrb:JMP WR
 1730 .decr4 CMP#32:BCS decr3
 1740  JSR decrb:ORA#64
 1750 .decr3 JMP WR
 1760 .decrb PHA:LDA#124:JSR WR:PLA:RTS
 1770 .ishx CMP #ASC"A":BCC nu2
 1780  CMP #ASC"G":RTS
 1790 .isnu CMP #ASC"0":BCC nu2
 1800  CMP #ASC"9"+1:RTS
 1810 .nu2 SEC:.nu5 RTS
 1820 .isal CMP #ASC"A":BCC nu2
 1830  CMP #ASC"Z"+1:BCC nu5
 1840 .islc CMP #ASC"a":BCC nu2
 1850  CMP #ASC"z"+1:RTS
```

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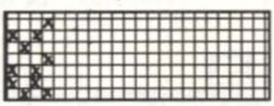

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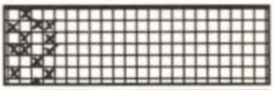

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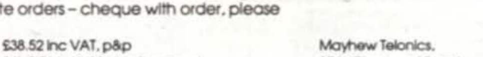

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◀ *From Page 106*

```
1860 .uc JSR islc:BCS uc2
1870  SEC:SBC#&20:.uc2 RTS
1880 .mula LDX#16
1890 .ML CLC:ROR R2H:ROR R2L
1900  BCC MC:JSR add13
1910 .MC CLC:ROL R1L:ROL R1H
1920  DEX:BNE ML:RTS
1930 .add13
1940  LDA R1L:CLC:ADC R3L:STA R3L
1950  LDA R1H:ADC R3H:STA R3H:RTS
1960 .x13 LDA R1L:PHA:LDA R3L:STA R1L
1970  PLA:STA R3L
1980  LDA R1H:PHA:LDA R3H:STA R1H
1990  PLA:STA R3H:RTS
2000 .prs STA RL
2010  PHP:PLA:STA AC:STY RH
2020  PLA:STA ZL:PLA:STA ZH:TXA:PHA
2030 .pr1 INC ZL:BNE pr2:INC ZH
2040 .pr2 LDY#0:LDA (ZL),Y
2050  CMP#ASC"~":BEQ prsx
2060  JSR przb:JMP pr1
2070 .prsx PLA:TAX
2080  LDA ZH:PHA:LDA ZL:PHA:LDY RH
2090  LDA AC:PHA:PLP:LDA RL:RTS
2100 .przb CMP#ASC"|":BEQ crlnf:JMP WR
2110 .crlnf2 JSR crlnf
2120 .crlnf PHP:PHA
2130  LDA#13:JSR WR:LDA#10:JSR WR
2140  PLA:PLP:RTS
2150 .spc JSR prs:EQUS" ~":RTS
2160 .adc LDX#0
2170 .adcl CMP#10:BCC adcz
2180  SEC:SBC#10:INX:BNE adcl
2190 .adcz PHA:TXA:BEQ adcy:JSR adck
2200 .adcy PLA
2210 .adck CLC:ADC#ASC"0":JMP WR
2220 .dtbp JSR gkst:BEQ dtff
2230  LDA (SL),Y
2240  JSR isnu:BCC dtnh
2250  CMP#ASC"&":BEQ dtih
2260 .dtff SEC:RTS
2270 .dtih INY:LDA#16:BNE dtal
2280 .dtnh LDA#10
2290 .dtal STA RL
2300  LDA#0:STA R3L:STA R3H
2310 .dtbl JSR x13
2320  LDA#0:STA R2H:STA R3H
2330  LDA RL:STA R2L
2340  LDA (SL),Y:JSR isnu:BCC dtdc
2350  LDA RL:CMP#16:BNE dtbx
2360  LDA (SL),Y:JSR uc:JSR ishx
2370  BCS dtbx
2380  SEC:SBC#ASC"A"-10:BNE dtd2
2390 .dtdc SEC:SBC#ASC"0"
2400 .dtd2
2410  STA R3L:INY:JSR mula:JMP dtbl
2420 .dtbx CLC:RTS
2430 .WR PHP:JSR WA:PLP:RTS
2440 .wasmat EQUB 0:.expo EQUB 0
2450 .expoint EQUB 0:.nbuff EQUB 0
2460 .remv BIT ison:BPL oremv
2470  JSR oswop:STX BL:STY BH
2480 .renter
2490  BIT expo:BPL remnox:INC expoint
2500  LDY expoint:LDA (AL),Y:BNE remxc
2510  LDA#0:STA expo:STA nbuff
2520 .remnox JSR oremv:BCS remx
2530  CMP#127:BNE nodel
2540  LDX nbuff:BEQ del2:DEC nbuff
2550 .del2 JMP remxc
2560 .nodel
2570  LDX nbuff:STA buff,X:INC nbuff
2580 .rechk PHA:JSR match:PLA
2590  BIT expo:BMI renter
2600  BIT wasmat:BMI remxc
2610  LDY nbuff:DEC nbuff:LDX#0:PHA
2620 .shuffle INX:LDA buff,X:DEX
2630  STA buff,X:DEY:BNE shuffle
2640  PLA:LDX nbuff:BNE rechk
2650 .remxc CLC
2660 .remx LDX BL:LDY BH:JMP oswop
2670 .oremv JMP 0
2680 .match LDA#&90:STA AH
2690  LDA#0:STA AL:STA wasmat
2700 .nloop LDX#0:LDY#0
2710 .mloop LDA (AL),Y
2720  CMP buff,X:BNE nomat
2730  INY:LDA (AL),Y:BEQ ahit
2740  INX:CPX nbuff:BNE mloop
2750  LDA#255:STA wasmat
2760 .nomat INC AH:LDA AH:CMP#&C0
2770  BNE nloop:RTS
2780 .ahit LDA#255:STA expo
2790  STY expoint:RTS
2800 .oswop PHP:PHA:TXA:PHA:TYA:PHA
2810  LDX#R1L:LDY#0
2820 .oswlp LDA 0,X:PHA
2830  LDA stuff,Y:STA 0,X
2840  PLA:STA stuff,Y
2850  INX:INY:CPY#20:BNE oswlp
2860  PLA:TAY:PLA:TAX:PLA:PLP:RTS
2870 .buff:]:stuff=buff+256:ENDPROC
2880 DEF PROCcli($&700):LOCAL X%,Y%
2890 Y%=7:CALL&FFF7:ENDPROC
```

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```
 100 =    0 0 |  570 = 4E48 7 | 1040 = 82C7 5 | 1510 = 56D1 5 | 1980 = E283 8 | 2450 = 3C08 4
 110 =    0 0 |  580 = AFBF 2 | 1050 = 83BD F | 1520 = 7D48 4 | 1990 = 4B96 8 | 2460 = D091 B
 120 =    0 0 |  590 = 1581 7 | 1060 = D5B1 B | 1530 = 470B 5 | 2000 =   89 C | 2470 = 5C26 8
 130 = 25DD D |  600 = D4B1 4 | 1070 = 531E D | 1540 = 8907 6 | 2010 = B987 C | 2480 = FD63 1
 140 = B1F1 A |  610 = AE4B A | 1080 = 5EFC 5 | 1550 = A2FD 3 | 2020 = C2B7 B | 2490 = F6C1 D
 150 = BDAB 2 |  620 = AA26 F | 1090 = 5275 1 | 1560 = 85E8 B | 2030 = 15C2 7 | 2500 = DFB5 F
 160 = 619F 1 |  630 = 63FC C | 1100 = 1781 E | 1570 = 833D C | 2040 = 2CD0 4 | 2510 = 749A F
 170 = FD2E E |  640 = FF8E 7 | 1110 = D7A3 9 | 1580 =  10B E | 2050 = 817A 4 | 2520 = 1FA5 D
 180 = 8FBB F |  650 = 5E23 6 | 1120 = 2A46 0 | 1590 = 3990 C | 2060 = E97F 9 | 2530 = 63B9 9
 190 = 5BE4 D |  660 = 4464 0 | 1130 = 436A 5 | 1600 = BBD1 0 | 2070 = B2DB 3 | 2540 = 4C48 D
 200 = DCEB A |  670 = EFD3 6 | 1140 = 4DF5 B | 1610 = 7E18 A | 2080 = 4979 A | 2550 = A40B F
 210 = 7A38 D |  680 = E261 5 | 1150 = C959 E | 1620 = 531B 2 | 2090 = D7AC 7 | 2560 = F0BD 2
 220 =  F5C 3 |  690 = 21CE 0 | 1160 = 4BEF 0 | 1630 = D09E 8 | 2100 = 8615 8 | 2570 =  6DD C
 230 = BD70 3 |  700 = 23F3 9 | 1170 = 5297 6 | 1640 = C1DD 2 | 2110 = 5C01 9 | 2580 = 8046 A
 240 = C5CD 4 |  710 = 3580 F | 1180 = FFA3 3 | 1650 = 612F C | 2120 = AF3F 6 | 2590 = 1CB1 1
 250 = 6C02 3 |  720 = 60AF A | 1190 = 72A4 1 | 1660 = F136 7 | 2130 = B93D 3 | 2600 = E47E F
 260 = ED0F 9 |  730 = 52F8 4 | 1200 = FF15 6 | 1670 = 5994 3 | 2140 = A581 7 | 2610 = 79FD 8
 270 = 1A12 0 |  740 = C2DD F | 1210 = 32AF 4 | 1680 = 41B4 8 | 2150 = 7848 4 | 2620 = 28AF F
 280 = 3AE7 2 |  750 = 633B 5 | 1220 = 61DE A | 1690 = D990 8 | 2160 = 631D A | 2630 = 7515 A
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 300 = 2C2A C |  770 = 832D 8 | 1240 = 1FC3 0 | 1710 = 1E0A B | 2180 = E5C5 0 | 2650 =  D36 8
 310 = 94A6 6 |  780 = 5E23 C | 1250 =  91C 7 | 1720 = F184 3 | 2190 = 4D7B 2 | 2660 =   82 F
 320 = C785 8 |  790 = A663 4 | 1260 =  3CD 9 | 1730 = 5FB5 5 | 2200 = 31FA 6 | 2670 = 307F 9
 330 = 69B2 1 |  800 = E15F 2 | 1270 = 9980 8 | 1740 = 9BC3 C | 2210 = BE2D A | 2680 = DEA7 3
 340 = 3809 0 |  810 =  F6B 7 | 1280 = C150 6 | 1750 = C595 1 | 2220 = F891 D | 2690 = 5744 6
 350 = 829F 4 |  820 = F567 5 | 1290 = 1D4E E | 1760 = FE4F 1 | 2230 = FBA3 C | 2700 = A179 7
 360 =  339 9 |  830 = 3300 4 | 1300 = D68C 8 | 1770 =  D48 4 | 2240 = AC06 E | 2710 = 2FBC F
 370 = 8F96 6 |  840 = 1D4E B | 1310 = B9C5 4 | 1780 = C43E 9 | 2250 =  519 7 | 2720 =  47E 5
 380 = 7635 5 |  850 = BE60 0 | 1320 =  5B9 0 | 1790 =  618 8 | 2260 = 246A 9 | 2730 = A8A0 5
 390 = AB6C E |  860 = 463C 9 | 1330 = 5FF0 6 | 1800 = EF6F 4 | 2270 = 4F1B 8 | 2740 = 422D 3
 400 = 8754 7 |  870 = 1369 C | 1340 = 547E 4 | 1810 = 96CE 9 | 2280 = FB78 B | 2750 = C790 C
 410 = CEF4 B |  880 = BD18 E | 1350 = FF0F 1 | 1820 = FD00 8 | 2290 =  FAE 9 | 2760 = 78F8 0
 420 = 99B2 1 |  890 = 418B 3 | 1360 = 74E9 D | 1830 = 96BB 0 | 2300 = 33E0 1 | 2770 = 9C24 4
 430 = 6C93 C |  900 = 7028 C | 1370 = 79B2 B | 1840 = 30EA 2 | 2310 = E96C 1 | 2780 = CFDC 4
 440 = 60CF E |  910 = 82BF 9 | 1380 = B557 D | 1850 = D1CA C | 2320 = C04A 6 | 2790 = F990 6
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 510 = 8C0F A |  980 = 1C74 7 | 1450 = A809 5 | 1920 = F271 0 | 2390 = 2818 8 | 2860 = 3B90 A
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 560 = 9524 1 | 1030 = 5540 9 | 1500 = E00C F | 1970 = C6A1 E | 2440 = 1596 0 |
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● Hi-80 Refills – Set of 4 Pens	**£7**
● LX800 Tractor Feed Unit	**£39**
● LX800 Cut Sheet Feeder	**£75**
● LX1000 Tractor Feed Unit	**£55**
● **Hitachi 672 Colour Plotter**	**£495**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£55**
IEEE 488	**£65**	RS232 + 8K Buffer	**£75**

PRINTER SHARERS

(Ideal for School environment)

Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£26
3 BBC Micros to 1 Printer	–	£58
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics)	**£65**

(Cables extra, specify type required when ordering)

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**
Compact's Special Centronics Lead	**£9**
RS232 Cable	**P.O.A.**
IBM Parallel 1 metre Cable	**£9**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
FX80/85/800/MX80	£4.50	£4.95
FX100/1000	£7.00	–
Kage KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
M1009/GLP	£4.00	£3.00
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Microvitec Metal	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	**£7**
2,000 Sheets 9½" × 11" Fanfold Paper	**£12**
1,000 Sheets 15" × 11" Fanfold Paper	**£9**
1000 Sheets true A4 Fanfold Paper	**£11**
2000 Sheets true A4 Fanfold Paper	**£20**
Teleprinter Roll (Econo paper)	**£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

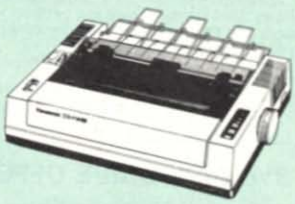
2764-250nS £3.00
27128-250nS £3.50

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.50
2 × 6264LP (16K) £4.80

Panasonic KX-P1081

(Now IBM/Epson Compatible)



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£155** (carr. £6)
Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional, logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£245** (carr. £7)

Single Sheet Feeder	**£195**
Tractor Feed	**£90**
Spare Ribbon	**£3.00**

Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

(Offer valid while present stocks last)

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

Pack of 4 refills **£10**

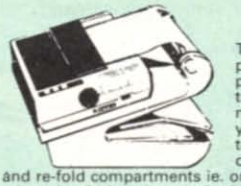
Screen Dump ROM for JP101 £10

Anti-Glare VDU Screen

This extremely effective, easy to install, 12" VDU screen eliminates harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

£12

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

● 1431 – Medium resolution as used on the BBC television computer programme	**£175**
● 1451 – High resolution, suitable for word processing in mode 0	**£225**
● 1441 – High res, exceeds the capabilities of the BBC micro	**£359**
● 1431AP RGB + PAL and AUDIO	**£199**
● 1451AP RGB + PAL and AUDIO	**£255**
● **2030 CS 20" Med Res**	**£380**
● **204 CS 20" Hi Res**	**£675**
● Dust Cover for Microvitecs	**£5.50**
● Touchtec 501 Touch Screen	**£239**

KAGA-TAXAN 12"

● TAXAN KX117 Hi-res Green Monitor	**£75**
● TAXAN KX118 Long persistence Hi-Res Green Monitor	**£85**
● TAXAN KX119 Ultra-Hi-Res Amber Monitor	**£85**
● TAXAN Super Vision 2 **Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing	**£269**
● **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	**£319**

STAR BUY

● **PHILIPS 14** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £209

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	**£69**
Amber (New Design) Hi-res	**£74**

LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES

for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without lifting the monitor. (See drawing on left).

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built-in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr. £3)

CO-PRO Adaptor

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£35.00 (carr £5)

Continued ⟶

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

● *Complete Disc Interface Kit including DFS ROM and fitting instructions*	**£46**
● *Acorn's 0.90 DFS Kit complete*	**£45**
● *DFS Manual (Comprehensive)*	*(no VAT)* **£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).	
● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**
● *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**	
● *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*	

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

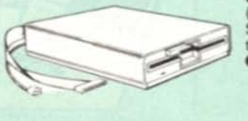
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£25.00.**

● Special introductory offer	**£39.00**
● DDFS Manual	(No VAT) **£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

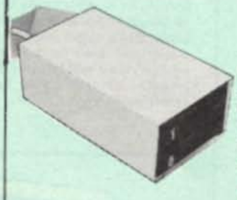
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

● Single 400K Drive	**£69**
● Twin 800K Drives	**£126**

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

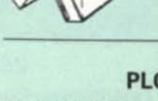
The heads in floppy drives are precision made and very sensitive to dift. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** - holds upto 50 5¼" discs	**£6.50**
● **M85** – holds upto 95 5¼" discs	**£8.00**
● **M25** – holds upto 25 3 ½" Discs	**£5.50**
● **M50** – holds 50 3½" Discs	**£7.50**



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

PLONKER BOX

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost PLONKER BOX. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20**	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

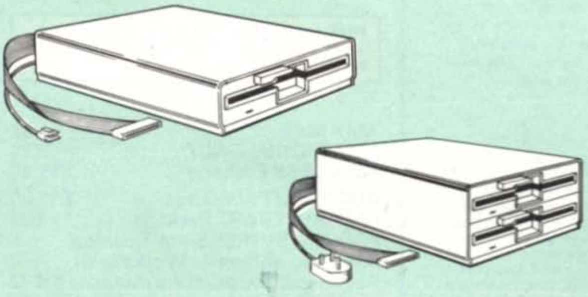
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £174	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £175		CD 800S £189

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£8.50***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£10.50***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£13***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£13***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£28***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£15***
● *10 × 3½" D/S D/D 40/80 track Discs*	***£19.50***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£18***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£7***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£9***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£11***
● *3" Double Sided Discs*	***£3** each*

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type –	**S-S 40T**	**D-S 40T**	**D-S 80T**
● Without Sleeves	**£35**	**£39**	**£45**
● With Sleeves	**£38**	**£42**	**£48**

ACORN WINCHESTER DRIVES

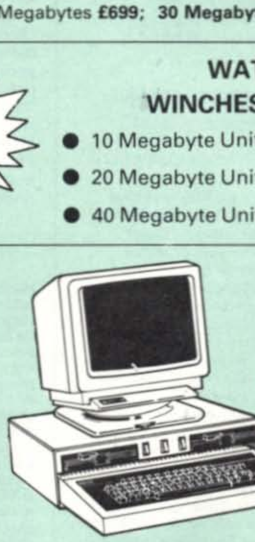
Supplied complete with Level 3 Econet File Server software.
20 Megabytes **£699; 30 Megabytes £1549**

WATFORD's WINCHESTER DRIVES

PRICES SLASHED

● 10 Megabyte Unit with ADFS	**£399**
● 20 Megabyte Unit with ADFS	**£499**
● 40 Megabyte Unit with ADFS	**£749**

CDP800S

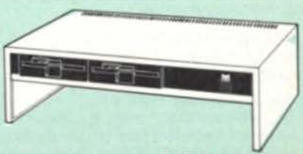


CDPM800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.
In response to popular demand, we are now able to offer a 3½" and a 5¼" disc drives mounted in a similar plinth as above for both, BBC and Master microcomputers. This new Disc Drive type number is DP35-800S.

CDP 800S for BBC Micro £199
CDPM 800S for Master £205
DP35-800S for BBC/Master £175
(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£250~~ **Our Price: Only £189** (carr £7)

NOMINATED FOR
MICRO
BRITISH COMPUTING
AWARDS
1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ." ". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".
The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint, is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***

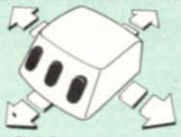
N.B.
1. Quest Paint supplied complete with Software in a 32K ROM; Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN + PENPAL 2

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
With every lightpen, we supply our sophisticated Penpal 2, lightpen software (Disc) FREE.

Price Only £19

THE AMX MOUSE



ONLY: £59 Inc. Super Art package
(carr £1.50)
(Please specify for BBC or Master Computer)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

AMX MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	**£32**

We are giving away absolutely FREE, our PAGE-GONTS disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£9.50**
AMX DESIGN (ROM)	**£59**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX Stop Press	**£39**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop	

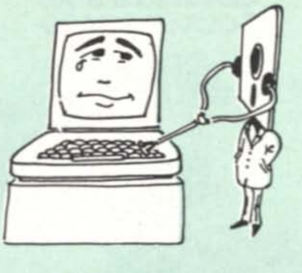
RB2 Marconi Tracker Ball

Complete with Software Disc	£59
RB2 + Software Disc + Quest Paint	£85

FLEET STREET EDITOR

Software pack for BBC/Master	**£36**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety of styles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mode 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating and running 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

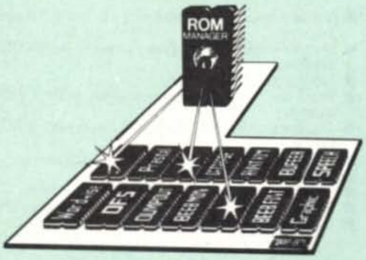
ENGLISH DICTIONARY
ROMSPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER

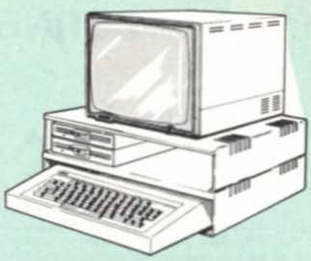


Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

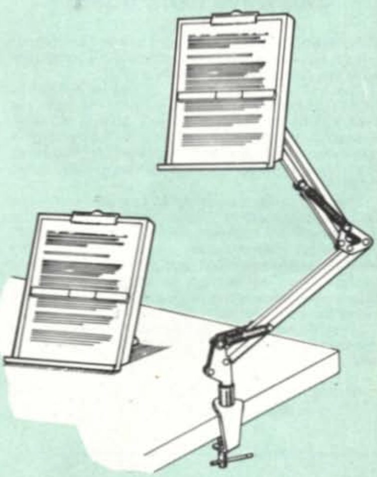
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued ⟶

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

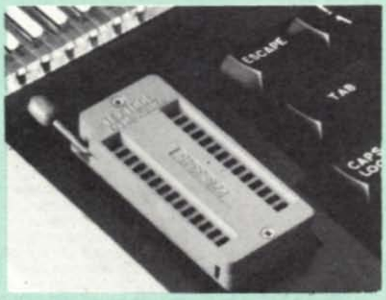
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

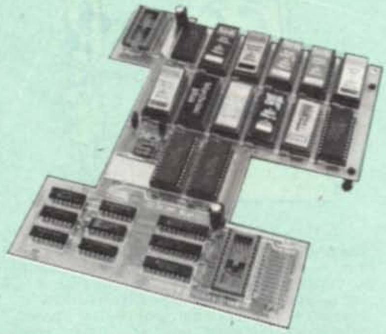
Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery baskup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

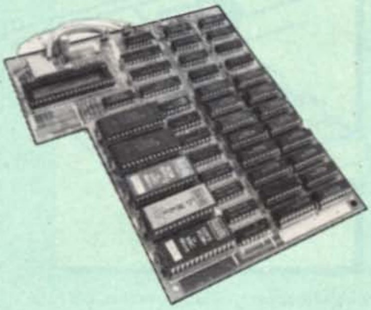
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£19**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	*£39*
● ROM/RAM card with 64k dynamic RAM	*£52*
● ROM/RAM card with a massive 128k dynamic RAM	*£80*

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	*£6*
● *16k Dynamic RAM for Upgrade*	*£7.50*
● *Battery backup*	*£3*
● *Read and Write protect switches*	*£2 each*
Complete ROM-RAM board All options installed	*£89*

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£84***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software **Only £75**
COMMSTAR ROM package only **£29**
(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **FREE £5 off Micronet Annual Subscription including Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£84** **(Carr £3)**
(Write in for full specification)

Minerva Systems Software

System Delta with Card Index	**£55**
System Programmers Ref. Guide	**£19**
System Gamma	**£43**
System Gamma Prog, Ref, Guide	**£19**
System Mailshot	**£17**
System Reporter	**£17**
System Intrer/View Link	**£17**
System Sales Ledger	**£39**
System Purchase Ledger	**£39**
System Nominal Ledger	**£48**
System Stock Management	**£39**
Order Processing/Invoicing	**£39**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise

£24

Wordwise plus

WORDWISE PLUS
£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART

ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE **£55**

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	**£35**
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£75**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29
Adv. Rom Manager	£13

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM **£7**

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

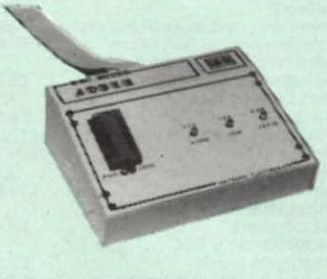
THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs:
From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

TEX EPROM ERASERS

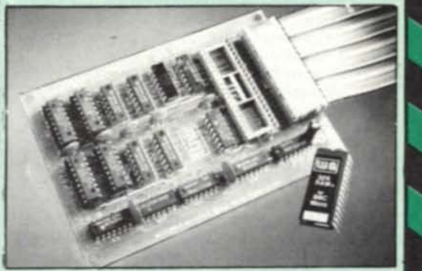
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£3.95
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40 Best machine Code Routines	£7.95
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68000 Programming the	£22.95
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Assembly Language Programming FOR the BBC Micro	£8.95
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BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro & the small Business	£5.75
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BBC Micro Programming Tips	£8.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
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Popular Educational Software

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● WAVES: Science Topics (Disc) CSC O Level Physics program.	**£14.95**
● RELATIONSHIP: Science (Disc) O Level Biology program.	**£14.95**
● BONDING: Science (Disc) O Level Chemistry program.	**£14.95**
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	**£14.95**
● ELECTRONICS IN ACTION (Disc) O Level program	**£14.95**
● NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	**£20**
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● POLYMERS (Disc) O Level program.	**£20**
● Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	**£20**
● FOOD & POPULATION (Disc) O Level program.	**£20**
● MICROTECHNOLOGY (Cassette) O Level program.	**£6.95**
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● Modem Master (Disc)	**£11.25**
● ADVANCED TELETEXT SYSTEM	**£8.55**
● PERIOD TABLE SOFTWARE	**£20**
● USING YOUR COMPUTER (Cassette) 8-12 age	**£24**

BEEB
VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

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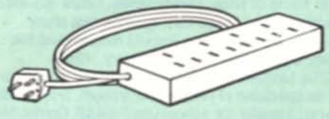
4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£7.95 (carr £1.50)

SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

£12.50 (carr. £1.50)

SPARES for BBC Micro

Keyboard	**£46**	Keystrip	**£2**
UHF Modulator	**£4**	Case	**£20**
Speaker Grill	**£1**	Speaker	**£2**
Power Supply	**£59**	Keyswitch	**£1.50**

Replacement FLEXIBLE 17 way Keyboard Connector £3

---

8 WAY DIP SWITCHES

With these DIP switches soldered to their keyboard, any BBC B or B+ owner can take full advantage of the fast disc drives that we supply by configuring his BBC for fast disc drive operation.

Excellent value for money at **£1.00**

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (suitable for disc drives with PSU).

Price £14

CONNECTING LEADS

(All ready made and tested

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–
6 way Power Connector	–	95p

Watford Dealers' List

UNITED KINGDOM

Badger Micros (Devon), Badger's Hill,
Southerton, Ottery-St. Mary, Devon EX11 1SE.
Tel: 0395 68516.

Beebug Retail, Dolphin Place, Holywell Hill,
St. Albans.

Cambridge Computer Store, 4 Emmanuel St.,
Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd,
Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing,
West Sussex. Tel: 0903 213361.

HCCS, 575-583 Durham Road, Low Fell,
Gateshead, Nr. Newcastle Upon Tyne.
Tel. 091 4870760.

Mancomp Ltd, Printworks Lane, Levenshulme,
Manchester. Tel: 061-224 1888-9888.

Microman Computers, Pasture Lane Farm,
Pasture Lane, Rainford, St. Helens, Merseyside
WA11 8PU. Tel: 074488 3667.

The Computer Depot, 205 Buchanan Street,
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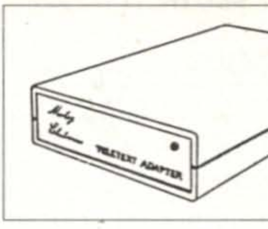

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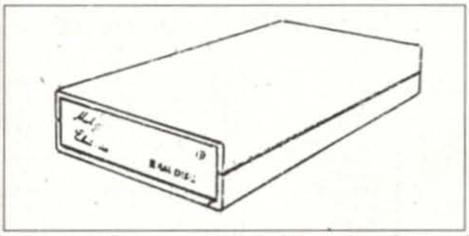

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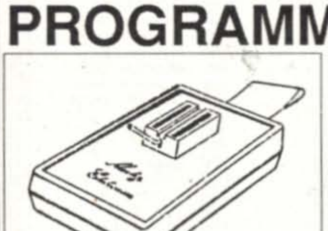

The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.

This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

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MASTER SMART CARTRIDGE

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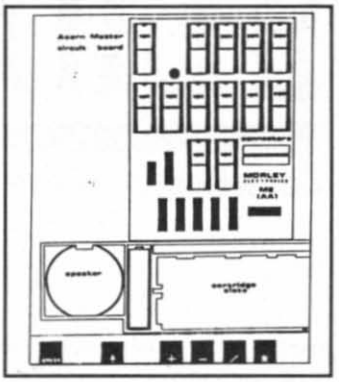

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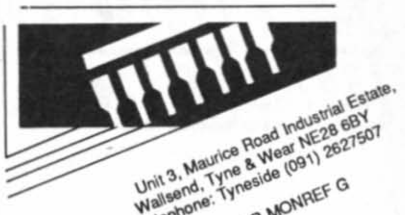

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THE MICRO USER

PROGRAM Library No.10

Compiled by Steve Turnbull

This month we have the final word on decimal to roman conversion (it has been pointed out to us that the Romans probably didn't use subtractive counting methods, even though we do it with roman numerals nowadays).

Since Christmas is almost on us we have a segment program for Wordwise Plus owners so that they can put personalised labels onto their envelopes.

Other gems are a sideways ram clear program, an Ascii number-to-integer conversion program (any base) and finally a utility to allow you to turn down the sound in your games.

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Title: Ascii to Integer
Language: 6502
Author: Pietter Allaart

Most utility roms require input of integer numbers, for example Basic line numbers, memory addresses and so on. This routine takes an Ascii string and converts this to a two byte number. It can easily be incorporated in your own utilities.

On entry the Ascii string is pointed to by (&F2),Y and the accumulator contains the base. The routine skips any leading spaces and zeroes. Each time a valid digit is found (as specified by the base) the part result is multiplied by the base then the new value added. The text pointer is then incremented to the next digit. On exit locations &70 and &71 contain the number.

The routine terminates on encountering a comma, a space or a Return.

```
  100 REM Ascii to Integer Converter
  110 PROCassemble
  120 REPEAT:PROCinput
  130 PROCconvert(number$)
  140 UNTIL FALSE:END
  150 DEF PROCinput
  160 INPUT"Enter a number: "number$
  170 IF number$="" END
  180 REPEAT
  190 INPUT"Enter base (2-62,B,D,H): "ba
se$
  200 b$=LEFT$(base$,1)
  210 IF b$="B" base$="2"
  220 IF b$="D" base$="10"
  230 IF b$="H" base$="16"
  240 base%=VAL(base$)
  250 UNTIL base%>1:ENDPROC
  260 DEF PROCconvert(number$)
  270 buffer=&700:$buffer=number$
  280 !&F2=!&F2 AND &FFFF0000 OR buffer
  290 Y%=0:A%=base%:CALL convert
  300 PRINT"The number was: ";!res AND
&FFFF
  310 PRINT:ENDPROC
  320 DEF PROCassemble
  330 res=&70:work=&72:base=&74
  340 pointer=&F2:DIM code 200
  350 FOR L%=0 TO 2 STEP 2
  360 P%=code:[OPT L%
  370 .convert STA base:DEY
  380  LDA #0:STA res:STA res+1
  390 .loop1 INY:LDA (pointer),Y
  400  CMP #32:BEQ loop1
  410  CMP #13:BEQ done
  420  CMP #32:BEQ done
  430  CMP #ASC",":BEQ done
  440  CMP #ASC"0":BCC bad_num
  450  CMP #ASC"9"+1:BCC ok
  460  CMP #ASC"A":BCC bad_num
  470  SBC #7
  480  CMP #ASC"Z"-6:BCC ok
  490  CMP #ASC"a"-7:BCC bad_num
  500  CMP #ASC"z"-6:BCS bad_num
  510  SBC #6
  520 .ok SBC #ASC"0"-1
  530  CMP base:BCS bad_num
  540  STA work+1:LDA #0:STA work
  550  LDX base
  560 .loop2 PHA:LDA work
  570  ADC res:STA work
  580  PLA:ADC res+1
  590  CLC:DEX:BNE loop2
  600  STA res+1
  610  LDA work:ADC work+1:STA res
  620  BCC loop1
  630  INC res+1:BCS loop1
  640 .done RTS
  650 .bad_num BRK:]:?P%=100
  660 $(P%+1)="Bad number"+CHR$(0)
  670 NEXT:ENDPROC
```

Get it right!

```
100 =    0 0 | 300 = FA28 5 | 500 = A1B8 E
110 = 126A A | 310 = D333 B | 510 = 9D39 2
120 = EE93 5 | 320 = 98A5 A | 520 = 3E96 5
130 = 2D44 8 | 330 = 5A24 4 | 530 = 43FF 7
140 = DADE 3 | 340 = 5A87 2 | 540 = 9E8C E
150 = 4F14 5 | 350 = AAB9 5 | 550 = F7C7 0
160 = 4F15 D | 360 = 7CBB 7 | 560 = A1A4 F
170 = 2615 2 | 370 =   DF E | 570 = 965C 9
180 = BFBA 1 | 380 = F237 2 | 580 = 9E1B E
190 = 4B9E 8 | 390 =  EFB 0 | 590 =  BA5 D
200 = BE99 4 | 400 = 1BAD 3 | 600 = 744B D
210 = 7F53 C | 410 =  75A 8 | 610 = CB26 C
220 = 6B72 A | 420 = C8AC 6 | 620 = 11C7 7
230 = CF23 5 | 430 =  1D3 F | 630 = E85B D
240 = E48C 3 | 440 = A8FC 3 | 640 = 2590 7
250 = C4F2 0 | 450 = B5A6 1 | 650 = 4043 8
260 = BD45 1 | 460 = A31A E | 660 = 5AB8 1
270 = 7295 2 | 470 = 8D18 8 | 670 = E531 A
280 = 58F0 B | 480 = BE63 A |
290 = F5B1 2 | 490 = 6DE7 7 |
```

Title: SWR Clear Routine
Language: 6502
Author: David Gillett

The routine below creates a short piece of machine code which selects a specific rom and wipes it to zeroes.

This will solve the problem that F.Beaches had in the October issue of *The Micro User*.

```
   10 REM * SWR Clear *
   20 REM by D.A.Gillett
   30 PROCass
   40 INPUT"Rom number (0-F)",r$
   50 store?1=EVAL("&"+r$)
   60 *SAVE Clearom 900+2D
   70 END
   80 DEFPROCass
   90 FOR X%=0 TO 2 STEP 2
  100 P%=&900:[OPTX%
  110 LDA &F4:PHA:.store
  120 LDA #&FF:STA &FE30:STA &F4
  130 LDA #&00:STA loop+1
  140 LDA #&80:STA loop+2
  150 LDA #&00:LDX #&40
  160 .loop STA &FFFF
  170 INC loop+1:BNE loop
  180 INC loop+2:DEX:BNE loop
  190 PLA:STA &FE30:STA &F4:RTS
  200 ]:NEXT:ENDPROC
```

Get it right!

```
10 =    0 0   80 = DB18 E  150 = 8E90 7
20 =    0 0   90 = 903D 8  160 = 414C 8
30 = CD80 0  100 = C452 F  170 = 441E B
40 = DEEA 3  110 = 32FD D  180 = 51C2 7
50 = 74E3 E  120 = E4C3 F  190 = CEFC 3
60 = 6F30 B  130 = D2AA 6  200 = 953B A
70 = FD2E 4  140 = E993 7
```

Title: Decimal to Roman Conversion
Language: Basic
Author: Dr.R.M.Flinn

As a final comment on the war of the converters, I wrote the following routine in 1981 for converting dates. The method has since appeared under a variety of author's names. This one is in only six lines and runs faster than any of the others given previously.

```
  100 REM * Decimal/Roman *
  110 REPEAT INPUT"Decimal",D$
  120 PRINT FNroman(D$)':UNTIL FALSE
  130 DEF FNroman(Y$):LOCAL X$,R$
  140 R$="01113444470123212342IIIVIIIXXX
LXXXCCCDCCCMMMvMMMxxxlxxxcccdcccmmm"
  150 FOR I%=1 TO LEN(Y$)
  160 J%=7*LEN(RIGHT$(Y$,LEN(Y$)-I%))+VA
L(MID$(R$,VAL(MID$(Y$,I%,1))+1,1))
  170 IFJ%<>0X$=X$+MID$(R$,J%+20,VAL(MID
$(R$,VAL(MID$(Y$,I%,1))+11,1)))
  180 NEXT:=X$
```

Get it right!

```
100 =    0 0  150 = 3DB7 4
110 = 6419 9  160 = 6A93 3
120 = D024 1  170 = 685A A
130 = C0B3 7  180 = 3A30 6
140 = BF28 6
```

Title: WW+ Label Messages
Language: WW+
Author: Ray Garnett

This short Wordwise Plus segment program should help brighten up your Christmas address labels with a little message on each one.

When you type in the segment program set *M$* to your message, *N%* to the number of lines in the label and *C%* to the width of the label in characters.

Type or load in your name and address file into segment 1. Each entry would normally consist of a name and title followed by an address and any other information like telephone number, membership number and so on. Each record must be separated by a blank line.

You flag the records as follows: Any line starting with a + will not be printed, the rest of a record from a line starting with * will not be printed. The label printing process can therefore be selective after you've been through specifying the records that you want.

The line starting:

```
TYPE "|GES69 ...
```

may be altered to give your own preferred style of highlighting.

```
REM MESSAGE LABELS
REM Load NAMES into segment 1
REM
M$=">>>> Merry Christmas <<<<"
N%=8
C%=40
CLS
PRINT "Processing..."
IF LEN(M$)<=C% THEN GOTO continue1
PRINT "Message too wide for label!"
PRINT "Press ESCAPE...";
VDU 7
K$=GCK$
END
.continue1
SELECT TEXT
DELETE TEXT
SELECT SEGMENT 1
CURSOR TOP
D%=0
REPEAT
L%=0
REPEAT
SELECT SEGMENT 1
X$=GCT$
CURSOR LEFT
L$=GLT$
IF LEN(L$)<=C%-2 THEN GOTO continue2
PRINT
PRINT "Line too long for label!"
PRINT "Max characters (C%) =";
PRINT C%
PRINT "Hit SPACE then ESCAPE...";
VDU 7
K$=GCK$
END
.continue2
IF X$="*" THEN PROComitrest
IF X$="+" THEN GOTO next
IF L$="" THEN PROCreturns
IF L$="" THEN GOTO next
L%=L%+1
IF L%<=N% THEN GOTO continue3
PRINT
PRINT "Too many lines for label!"
PRINT "Maximum lines is given by N%=";
PRINT N%
PRINT "Hit SPACEBAR then Escape...";
VDU 7
K$=GCK$
END
.continue3
SELECT TEXT
IF L%=1THEN TYPE "|GES69|W"+"  "+L$+"|GE
S70|W|R"
IF L%>1 THEN TYPE "  "+L$+"|R"
.next
UNTIL L$=""
IF L%=0 THEN GOTO continue4
TYPE "|R"
D%=D%+1
VDU 31,0,2
DOLINE "Labels = "+STR$(D%)
.continue4
SELECT SEGMENT 1
UNTIL EOT
SELECT TEXT
CURSOR TOP
PRINT
PRINT "Align first label correctly."
PRINT "Use menu to preview or print."
PRINT "Press SPACEBAR...";
K$=GCK$
END
.omitrest
SELECT SEGMENT1
REPEAT
L$=GLT$
UNTIL L$=""
ENDPROC
.returns
SELECT TEXT
IF L%=0 THEN ENDPROC
IF L%=N% THEN ENDPROC
DOTHIS
TYPE "|R"
TIMES N%-L%-1
TYPE "|GES69|GES52|W"+M$+"|GES53|GES70|W
|R"
ENDPROC
```

THE MICRO USER PROGRAM Library No.10

Compiled by Steve Turnbull

Title: Sound Reducer
Language: 6502
Author: Majid Anwar

Many games do not have a sound off facility and most lack a sound reduction facility. Short of a hardware modification we'll have to make do with software.

The routine given here intercepts the *osword* vector and divides the volume parameters in osword 7 (SOUND) and osword 8 (ENVELOPE) by a predetermined factor. The value of *factor* is set in line 110, and has the following effects:

```
factor=1 half volume
factor=2 quarter volume
factor=3 eighth volume
```

Different software will require the code to be assembled to different locations in memory and you may need to experiment. With some software the routine will not work at all, due to direct sound programming, or redirecting vectors.

```
100 REM * Sound reducer *
110 data=&F8:fac=3:IF fac<1 END
120 wordv=!&20C AND&FFFF
130 FOR L%=0 TO 2 STEP 2
140 P%=&C00:[OPT L%
150 .start PHA:STA data:TYA:PHA
160  LDA data:STX data:STY data+1
170  CMP #8:BEQ envelope
180  CMP #7:BNE reset
190  LDY #3:LDA (data),Y
200  CMP #&FF:BNE reset
210  DEY:JSR nega:JMP reset
220 .envelope
230  LDY #8:JSR sign:INY:JSR sign
240  INY:JSR nega:INY:JSR nega
250  INY:JSR posi:INY:JSR posi
260 .reset PLA:TAY:PLA:JMP wordv
270 .sign LDA (data),Y
280  CMP #&80:BCC posi
290 .nega LDA (data),Y:EOR #&FF:]
300 FOR n=0 TO fac:[OPTL%:LSRA:]NEXT
310 [OPT L%:EOR #&FF
320  STA (data),Y:RTS
330 .posi LDA (data),Y:]
340 FOR n=0 TO fac:[OPTL%:LSRA:]NEXT
350 [OPT L%:STA(data),Y:RTS:]:NEXT
360 ?&20C=start MOD256
370 ?&20D=start DIV256
```

Get it right!

```
100 =    0 0 | 200 = 1AF5 6 | 300 = AF52 8
110 = 1C1F F | 210 = DB6C A | 310 = B024 C
120 = AAE0 8 | 220 = F709 2 | 320 = CC9B E
130 = AAB9 F | 230 = D458 4 | 330 = 2022 5
140 = C6BB 3 | 240 = 8F20 2 | 340 = AF52 7
150 = 158E 7 | 250 = 2B41 0 | 350 = 8F17 9
160 = C076 2 | 260 = A788 5 | 360 = B08B 9
170 = F6E7 6 | 270 = EA4B 5 | 370 = 55A8 7
180 = 8FE2 4 | 280 = EC58 B |
190 = F559 D | 290 = 6784 C |
```

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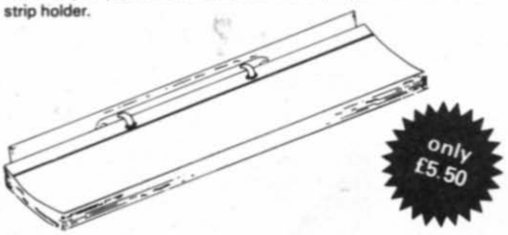

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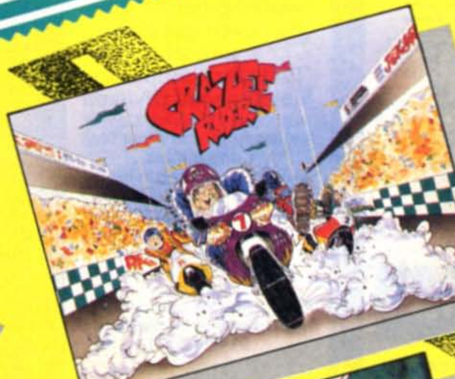
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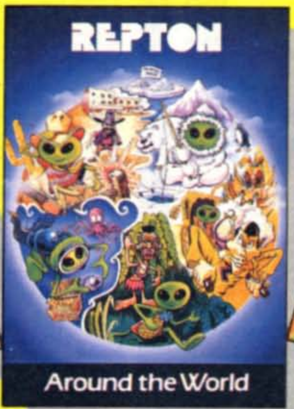
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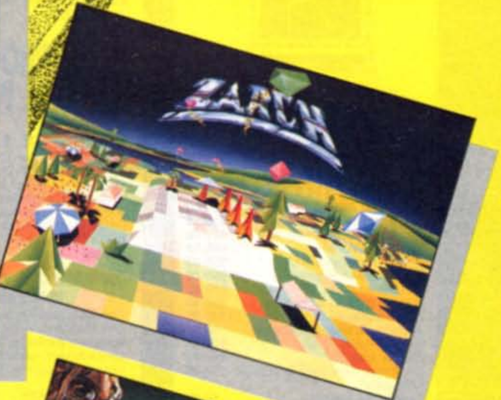

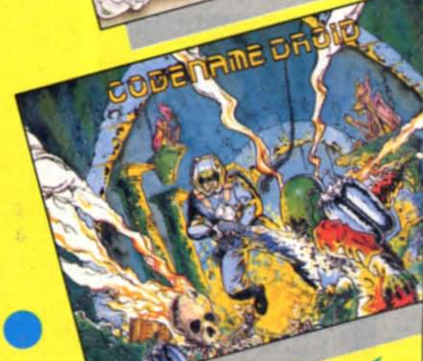
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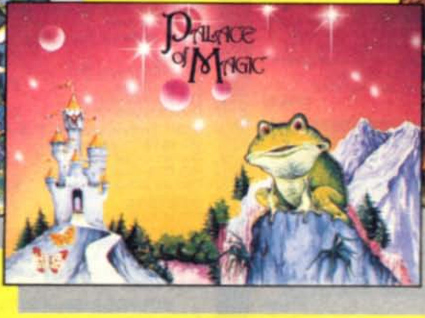
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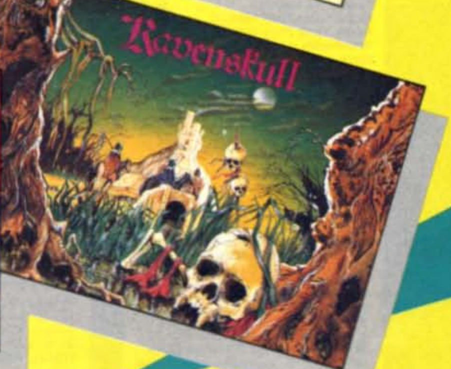
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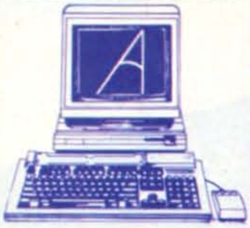

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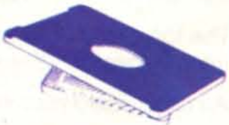

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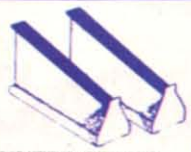

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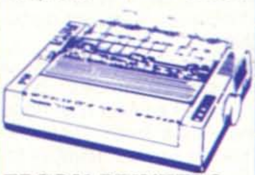

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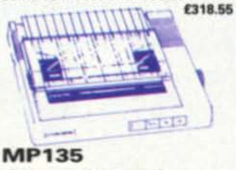

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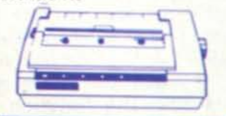

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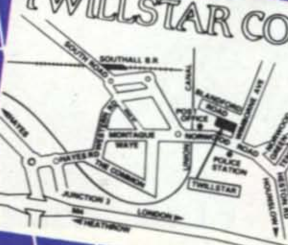

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Jeremy Brayshaw investigates a new teletext system for your BBC Micro

Putting on the teletext style

ONE of the more recent ideas to come from Watford Electronics is Ted – a teletext (Mode 7) screen designer. Mode 7 screens are quite different to any other screen mode available on the BBC Micro and use a series of control codes, each occupying one character space, to select display features such as coloured characters or graphics.

This form of display is almost identical to that used by Ceefax and Oracle for their broadcast teletext pages, and transmissions from either channel can be used directly as a Mode 7 screen on the micro.

Ted (short for Teletext EDitor) is a rom to help you design your own teletext magazine, and incorporates some sophisticated techniques to help you create complicated designs, then put your pages together for display in a show.

You can take existing pages from other sources, such as broadcast teletext or Prestel, and incorporate them in your own presentations. But beware of copyright on such work – the Ted manual doesn't mention this point but if you create sequences for commercial or public display, it may be a problem.

Ted is a 32k eprom mounted on a carrier board. Additional electronics are built in so that the BBC Micro thinks it is only a 16k chip, thus making it compatible with the full BBC Micro range except the Archimedes.

The carrier board adds height to the eprom (making it about three times as tall as a normal rom) causing it to rub against the underside of the keyboard when fitted in the main PCB rom sockets of my micro. However, using a rom expansion board, there were no such problems. A 117 page manual is provided but this sadly lacks an index – an omission which makes quick reference to a specific technique very difficult and frustrating, particularly if, like me, you don't refer to the manual until things start to go wrong.

There are so many features to this package that extensive use is made of Control in combination with other keys. These are very difficult to remember, and constant reference to the appendix in the manual, listing the 40 facilities provided in this way, is essential.

The function keys are also used heavily, providing a further 30 different controls, including most of the teletext display control codes.

The system can really be considered to be in two parts – a page editor, and a magazine display. The editor allows you to create or alter teletext style pages, and includes some impressive features.

Sections of the display can be copied to other areas of the screen, making it simple to duplicate the same design several times on one page.

Characters can be replicated in complete columns or rows, allowing you to, for example, begin each row with the same colour control codes without having to type each code in individually.

Margins can then be set to prevent you typing over these codes when your text overflows onto the next line – essential if you need to closely study the keyboard instead of the screen as you type.

The text manipulation facilities allow you to easily move, alter, insert and delete text, although a word-wrap facility is not included – continuous typing often results in words being split over two adjacent lines. Graphics are entered in the now standard way of using the Q, W, A, S, Z, and X keys to represent blocks of the character.

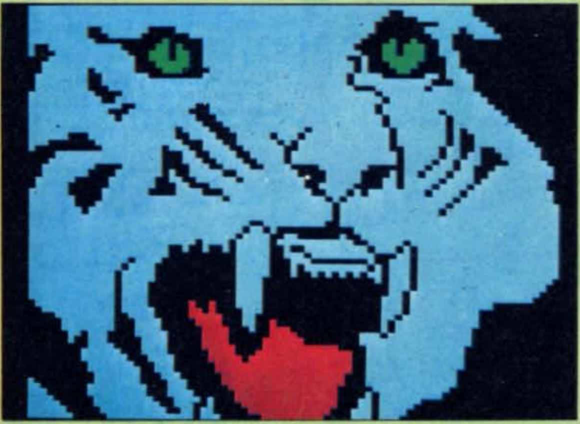
It is also possible to include pictures from other screen modes in your sequence. Ted will convert any mode 0, 1 or 2 screen into a mode 7 display.

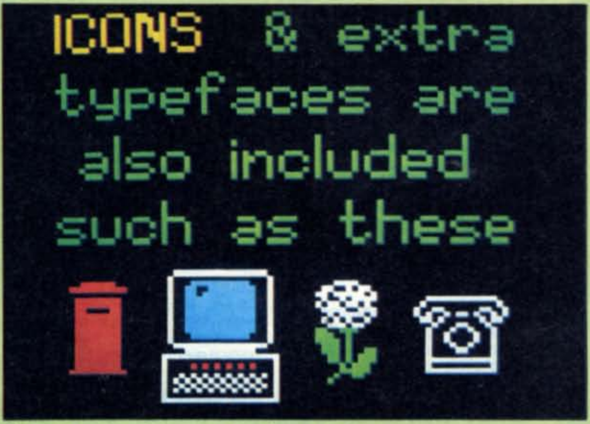
With a teletext screen being only 80 pixels by 75, most of the detail of the original picture will be lost, but some unique and very effective displays can be acheived in only a few seconds.

If you have a video digitiser and camera this routine allows you to include local items, landmarks, self-portraits and so on, to give your finished display sequence an unmistakable personal or local touch.

The rom contains a few drawings and text fonts for use in your own page designs – including pictures of computers, telephones, floppy discs, borders, and so on.

One of the important aspects when designing a teletext carousel is not to use the same graphic display too often.


You can create your own wildlife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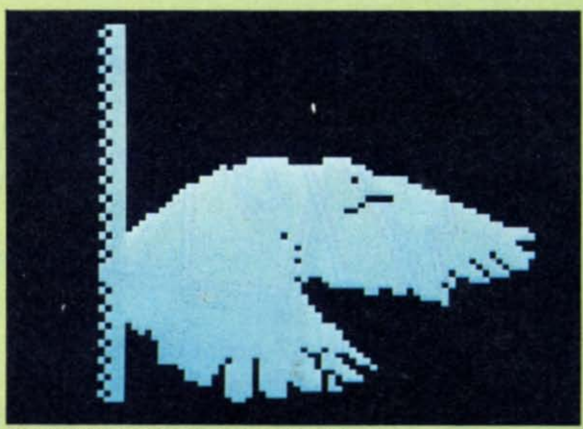
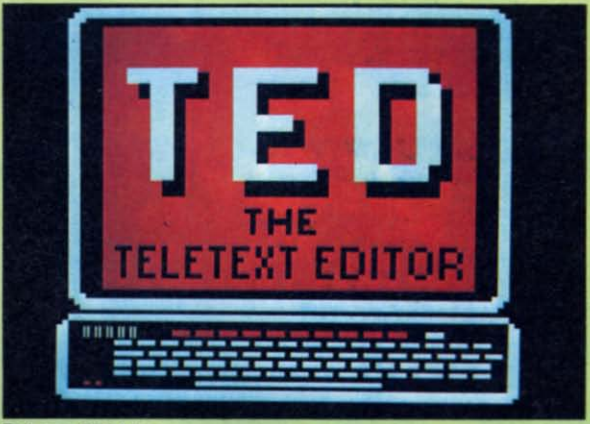


Bird in flight from the demonstration disc



Ted on a BBC Micro

Having a supply of ready-made characters and drawings to call upon tends to stifle the creative initiative and produce dull, repetitive displays. But with careful use, these items can be put to good effect, saving a lot of time.

They are particularly useful when first using the package – you can concentrate on getting to know the system rather than on the sometimes tedious task of designing intricate displays.

The editor includes page printout routines so you can dump your creations to a printer. The system is set up for Epson compatible printers, but can be reconfigured to use another printer dump rom if you have one.

In my job as telesoftware organiser at Ceefax I find the acid test for any Mode 7 screen dump routine is to print the engineering test page from Ceefax (Page 297).

It is easy to load teletext screens into the editor, so transferring pages from Ceefax to Ted simply involves saving the required page from teletext (using the ATS Save Page command) entering the Ted editing system then re-loading the page.

Ted made a valiant attempt at dumping the test page, but was confused by some of the characters and the result was not an exact copy of the screen. Watford assure me that this problem is now cured and an exact copy of the test page is produced with the current version (1.12).

As an alternative to the full graphics dump, a text only printout is available. This only looked for characters in the range ASCII 32 to 126, and therefore didn't work with pages taken from teletext.

A similar facility that sends the text of a page to a disc file had the same restrictions but both these problems are cured in later versions of Ted.

After creating your pages, they can be put together in sequence and displayed as a show. Here, the superb page-linking routines can produce some stunning displays.

The demonstration disc shows an animated sequence of a bird in flight, and it is very impressive. In order to achieve this, Ted uses direct screen memory addressing, and therefore the program will not work with a second processor, or on the Archimedes.

The show can be designed to operate without user intervention, by following a pre-set carousel routine, or in a viewdata type page linking system, where you type a number to choose the route for the following display.

The former allows a constant rolling display to be presented, valuable in situations where the viewer is not given access to the computer keyboard, or where individually selectable information may not be appropriate.

The latter display format gives some level of user involvement, offering a system where any specific information can be found very quickly through a series of menu pages. These allow you to avoid certain pages if they are not required and go directly to the information you are seeking.

When an automatic display is selected, the length of time each page remains on screen can be individually set, allowing the important frames to remain on screen longer than others. Display times can be as little as one tenth of a second, allowing some very effective animation sequences to be displayed.

Up to 23 pages can be saved in memory, forming a single show. However, any number of shows can be linked together, each one loading the next when required, so the only practical limit to the number of pages in a complete display sequence is the size of your disc. A single-sided 40 track disc can store over 90 screens, with the last screen in the sequence recalling the first one to give a continuous display.

An interesting feature of Ted is that each page overwrites the previous display in one of several different ways – cut directly to the new frame, scroll into view from the top or bottom of the screen or diagonally across the screen, or drop in from the top or bottom. If used with care, these routines can give a unique and very attractive finishing touch to your work.

A further feature of Ted is to allow a series of Mode 7 screens to be viewed as a continuous scrolling display. Once a show has been compiled, using either your own page designs or those taken from other sources, it can be displayed in scrolling format, moving forwards or backwards through the pages a single row at a time, adding the new rows to the top or bottom of the screen.

This allows articles that generally take up several pages to be scrolled through as if they were a continuous document.

The Ted package gives a new dimension to Mode 7 carousel systems, offering some stunning displays. It may take some time to create the pages, particularly when constant reference to the manual is hampered by the lack of a full index, and the function keys are not coded in an easily remembered or logical way, but your efforts are rewarded by very impressive display facilities.

All in all it's a very versatile teletext style display system.

Product: Ted
Price: £42.55
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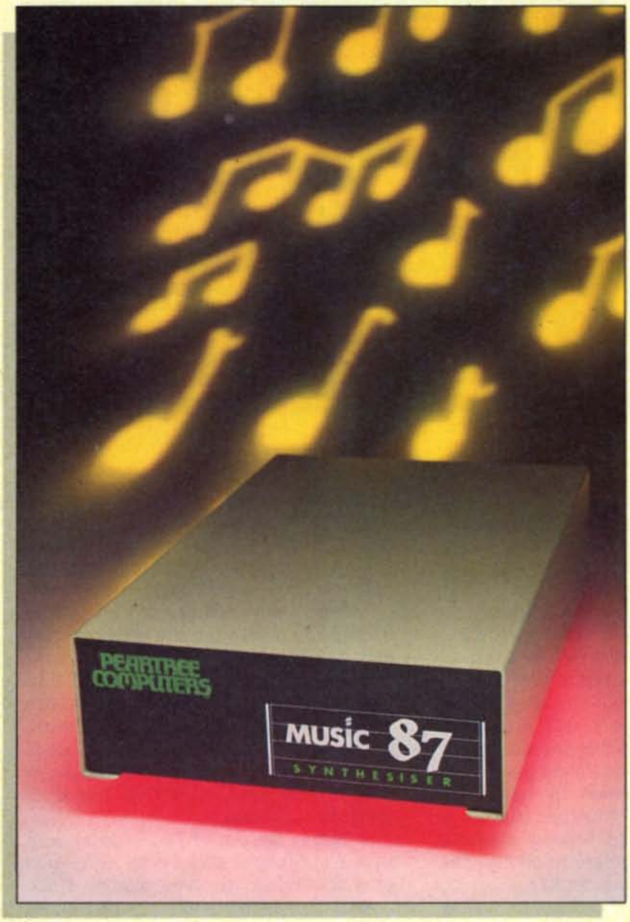

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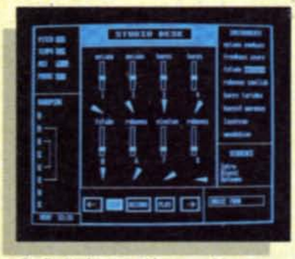
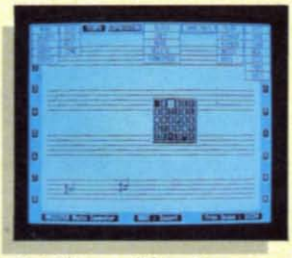
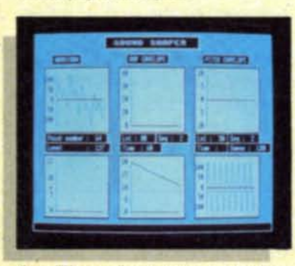


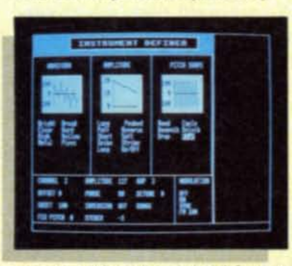
Studio Desk menu with mouse driven record, play, rewind options



Music Editor menu, light pen & mouse driven with complete menu options at top



Sound Shaper allowing you to create your own waveforms, envelopes, mouse, lightpen or keyboard driven



Instrument definer allows you to define your own instrument pitch, amplitude and wave forms

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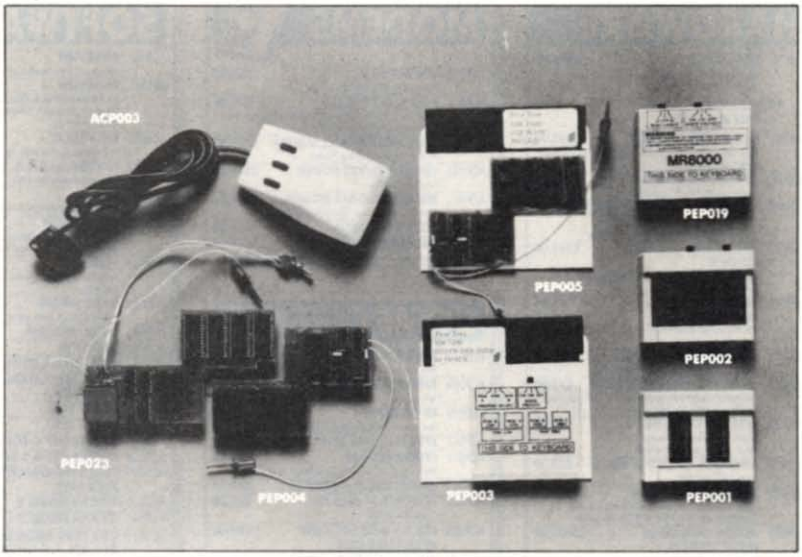

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In search of the lost chord

Ian Waugh brings a little music to your BBC Micro

IF you want your BBC Micro to play a tune how do you tell it which notes to play? It doesn't understand traditional music notation, and although you could write a stave editor it would be quite a complex task.

Your micro does understand numbers, but the trouble is that we don't. At least it's not easy trying to pick a tune out of something that looks like a machine code listing.

What we need is a halfway house, a Music Composition Language (MCL) which we can understand but which doesn't use 90 per cent of the micro's ram. The MCL presented here is based on my book, Making Music on the BBC Computer, but it has more facilities and produces a compact and saveable code so the music does not have to be re-compiled every time you play it.

The MCL Compiler program reads the music in MCL form from data statements, compiles it into a form the playback routine can understand and stores it in memory above the main program. It will typically save between 60 and 70 per cent of the memory occupied by the MCL which in itself is quite compact.

As it stands, the MCL supports envelope changes, repeat markers and three-channel harmony.

Enter the compiler program by itself, use the checksums to correct any typing errors and then save it. Each time you want to compile a new piece, enter the new tune in data statements starting at around line 3000. When you've typed them all in, issue the following commands:

```
SAVE"Mine"
*SPOOL mymusic
LIST
*SPOOL
```

This sequence saves a copy of your source music in the file *Mine* which you can load edit and save later. It also creates an Ascii version for adding to the compiler program:

```
LOAD"Compile"
*EXEC mymusic
RUN
```

You don't need to know exactly how the MCL Compiler works to write the music, but you do need to know what form to present it in.

The first item of data is the number of envelopes used in the piece and the following lines give the envelope numbers and definitions. The note data is then arranged in order, channel 1, channel 2 and channel 3. The data for each channel should start by declaring which envelope it is going to use, and the part must terminate with X.

The following music conventions are used: A note is represented by a note name (A to G) and an octave number (0 to 6). All accidentals are represented by the sharp sign (#) and the letter R indicates a rest.

The first note or rest must be followed by a duration value – anything from 1 to 255 – but it's a good idea to decide on a set of values and stick to them. For example, you may give a quaver a value of 1, in which case a crotchet will be 2 and a minim is 4 and so on.

All following notes and rests will take the last specified duration and further duration values need only be entered when a change of duration is required.

Envelope changes are indicated with a V followed by a number from 1 to the number of envelopes defined. You can repeat a section by enclosing it between angle brackets: < indicates the start and > the end. Repeats cannot be nested and are independent to each channel.

As the program compiles a tune it prints out the accumulated duration values of each channel. This may help you spot errors as the durations will usually be the same although this is not necessarily the case because repeats are not counted. For example, one channel could hold a repetitive bass line and contain lots of repeats while the other channels play a tune straight through.

It's usually a good idea to arrange the data in lines of one bar. If you're transcribing from sheet music you can easily see where you've got to.

Together with the listing of the MCL Compiler program is a *Hooked on Christmas* medley of tunes. The checksums for this listing is calculated separately from the MCL program so type it in separately as suggested earlier. This music should be played at tempo 2.

The program has deliberately been kept short and simple, but you could enhance it in a number of ways.

The loading and saving of compiled data could be automated, and the tempo could be included in the data, with an option to alter it while playing. You could include multiple (nested) repeats, 1st and 2nd time bars, the flat accidental and accents. You could incorporate a key signature so that in the key of A you would only have to enter C not C# – then you'd need to introduce a natural.

There are currently no error traps, these could be included. Although in the MCL you need only specify a duration value when it changes, the compiled code stores a duration along with each note. To make it even more compact you could apply the take-last-duration rule to the compiled code as well.

The program has been designed to use only the three tone sound channels (1 to 3) but it could be modified to include the noise channel, channel 0, so you could include a rhythm track too.

But still you've got to stop somewhere, and this is where I stopped.

```
   10 REM MCL Compiler
   20 REM by Ian Waugh
   30 MODE 7
   40 REM Start of Memory for Note DATA
   50 M%=&4000
   60 REM counter, channel memory, end f
lag, repeat flag, sign pointer, ENV. sto
re, ENV. definer
   70 DIM co%(3),ch%(3),end%(3),rflag%(3
),sgn%(3),env%(3),E%(14)
   80 scale$=" C C#D D#E F F#G G#A A#B"
   90 key=1
  100 PRINTTAB(5,3)"1) Compile Note DATA
"
  110 PRINTTAB(5)"2) LOAD Compiled Tune"
  120 PRINTTAB(5)"3) Play Tune"
  130 PRINT'TAB(5)"Enter Choice? ";
  140 REPEAT:G%=VAL(GET$):UNTIL G%>0 AND
G%<4
  150 PRINT;G%'
  160 IF G%=1:PROCcompile:END
  170 IF G%=3 PROCplay:RUN
  180 IF G%=2 THEN VDU12:*CAT
  190 PRINT'"Enter:"
  200 PRINT'" *LOAD"music" ";~M%
  210 END
  220 DEFPROCcompile
  230 count%=0
  240 REM Envelopes
  250 PRINT"Compiling ENVELOPEs"'
```

Turn to Page 137 ▶

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TO ORDER TURN TO THE FORM ON PAGE 149

◀ From Page 135

```
  260 READ noenvs
  270 M%?count%=noenvs:count%=count%+1
  280 FOR I%=1 TO noenvs
  290 FOR E%=1 TO 14
  300 READ M%?count%:count%=count%+1
  310 NEXT E%:NEXT I%
  320 REM Read in and Analyse Note DATA
  330 ptr%=count%:count%=count%+12
  340 FOR I%=1 TO 3
  350 PRINT"Compiling Channel ";I%;
  360 cdur%=0
  370 ch%(I%)=M%+count%
  380 REPEAT
  390 PROCanalyse
  400 UNTILnote$="X"
  410 IF I%=1 M%!ptr%=ch%(1)
  420 IF I%=2 M%!(ptr%+4)=ch%(2)
  430 IF I%=3 M%!(ptr%+8)=ch%(3)
  440 PRINT" Dur = ";cdur%
  450 NEXT I%
  460 PRINT"To SAVE DATA copy and enter
:"
  470PRINT" *SAVE"music" ";~M%;" ";~(
M%+count%+1)
  480 ENDPROC
  490 DEFPROCanalyse
  500 READ note$
  510 IF note$="X" M%?count%=255:count%=
count%+1:ENDPROC
  520 IF LEFT$(note$,1)="V" PROCenv:ENDP
ROC
  530 IF note$="R" pitch=63:GOTO 590
  540 IF note$="<" PROCsign:ENDPROC
  550 IF note$=">" PROCrepeat:ENDPROC
  560 IF LEN(note$)=2 name$=LEFT$(note$,
1) ELSE name$=LEFT$(note$,2)
  570 oct=VAL(RIGHT$(note$,1))
  580 pitch=key+INSTR(scale$,name$)/2-1+
(oct-1)*12
  590 READ dur$:IF dur$="X" PROCnote:not
e$="X":GOTO 510
  600 IF VAL(dur$)=0 PROCnote:note$=dur$
:GOTO 510 ELSE dur=VAL(dur$)
  610 PROCnote
  620 ENDPROC
  630 DEFPROCenv
  640 env=VAL(RIGHT$(note$,LEN(note$)-1)
)+128
  650 M%?count%=env:count%=count%+1
  660 ENDPROC
  670 DEFPROCsign
  680 M%?count%=64:count%=count%+1
  690 ENDPROC
  700 DEFPROCrepeat
  710 M%?count%=192:count%=count%+1
  720 ENDPROC
  730 DEFPROCnote
  740 M%?count%=pitch:M%?(count%+1)=dur
  750 cdur%=cdur%+dur
  760 count%=count%+2
  770 ENDPROC
  780 DEFPROCplay
  790 count%=0
  800 noenvs=M%?count%:count%=count%+1
  810 FOR I%=1 TO noenvs
  820 FOR E%=1 TO 14
  830 E%(E%)=M%?count%:count%=count%+1
  840 NEXT E%
  850 ENVELOPEE%(1),E%(2),E%(3),E%(4),E%
(5),E%(6),E%(7),E%(8),E%(9),E%(10),E%(11
),E%(12),E%(13),E%(14)
  860 NEXT I%
  870 INPUT"Enter tempo",tempo:IF tempo=
0 tempo=1
  880 end%=0
  890 FOR I%=1 TO 3
  900 co%(I%)=0:end%(I%)=0:rflag%(I%)=0:
sgn%(I%)=0:env%(I%)=I%
  910 NEXT I%
  920 ch%(1)=M%!count%:ch%(2)=M%!(count%
+4):ch%(3)=M%!(count%+8):count%=count%+1
2
  930 sync%=&200
  940 REPEAT
  950 FORP%=-8TO-6
  960 IFADVAL(P%)>0ANDend%(ABS(P%)-5)=0
PROCsound(ABS(P%)-5)
  970 NEXTP%
  980 sync%=0
  990 UNTILend%=3
 1000 ENDPROC
 1010 DEFPROCsound(chan%)
 1020 note%=ch%(chan%)?co%(chan%):co%(ch
an%)=co%(chan%)+1
 1030 IF note%<64 dur%=ch%(chan%)?co%(ch
an%):co%(chan%)=co%(chan%)+1:SOUNDchan%+
sync%,ABS(env%(chan%)*(note%<>63)),note%
*4+1,dur%*tempo:ENDPROC
 1040 IF note%=255 end%(chan%)=1:end%=en
d%+1:ENDPROC
 1050 IF note%=64 sgn%(chan%)=co%(chan%)
:rflag%(chan%)=1:GOTO1020
 1060 IF note%=192 AND rflag%(chan%)=1 c
o%(chan%)=sgn%(chan%):rflag%(chan%)=0:GO
TO 1020
 1070 IF note%=192 GOTO1020
 1080 IF note%AND128=128 env%(chan%)=not
e%-128:GOTO1020
 1090 ENDPROC
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 = 1092 2
  40 =    0 2
  50 =  360 5
  60 =    0 5
  70 = B20A 3
  80 = 984F 5
  90 =  396 8
 100 = 6E56 E
 110 =  604 1
 120 = 4E9D 1
 130 = DE77 B
 140 = F468 B
 150 = 925A C
 160 = A695 7
 170 = A816 C
 180 = 71B0 C
 190 = E498 6
 200 = BCAF E
 210 = FD2E A
 220 = D363 8
 230 =  CFF 1
 240 =    0 1
 250 = A929 E
 260 = C166 6
 270 =  7A5 C
 280 = B9F1 7
 290 = 5E89 B
 300 = 442F A
 310 =  2F7 5
 320 =    0 5
 330 = BF63 6
 340 = A62E 6
 350 = D9A9 8
 360 = 8B41 F
 370 = C5AA D
 380 = BFBA 8
 390 = 9416 E
 400 = CA55 C
 410 = EC6E 9
 420 = DDB7 4
 430 = 6E25 9
 440 = 8D6A 5
 450 = F839 7
 460 = 95DC 4
 470 = E0AC 1
 480 = ED0F C
 490 = 79B0 9
 500 =  DAB C
 510 = C697 E
 520 = 239D 7
 530 = 9D7C B
 540 = 78AA 0
 550 = 4784 F
 560 = D78D F
 570 = 33BA 9
 580 = 87AB E
 590 = B719 C
 600 = F623 7
 610 = CF99 E
 620 = ED0F 3
 630 = 2252 E
 640 = CCFF 6
 650 = 6AB5 D
 660 = ED0F A
 670 = 52A4 2
 680 = E94C 9
 690 = ED0F D
 700 = EF4B A
 710 = 11BA 5
 720 = ED0F D
 730 = 256E 3
 740 = 3C05 9
 750 = 326F C
 760 = C560 2
 770 = ED0F 8
 780 = EAF8 3
 790 =  CFF 8
 800 = 23F9 6
 810 = B9F1 D
 820 = 5E89 2
 830 = 7DE1 F
 840 = BD54 5
 850 = 6B5E 6
 860 = F839 A
 870 = 239C 1
 880 = 71E2 7
 890 = A62E E
 900 = 7068 1
 910 = F839 F
 920 = 3EBE B
 930 = AC31 5
 940 = BFBA 7
 950 = 26BC 8
 960 = 3BAB A
 970 = 9818 8
 980 = 6D4B 9
 990 = 8413 C
1000 = ED0F D
1010 = ED30 9
1020 = 46D6 A
1030 = A11D 3
1040 = 6D92 9
1050 = A9B4 2
1060 = 9C95 D
1070 = B6E1 A
1080 = 3BE3 3
1090 = ED0F 2
```

```
 3000 REM Hooked on Christmas
 3010 REM by Ian Waugh 1987
 3020 REM Tempo=2
 3030 :
 3040 DATA 9
 3050 DATA 1,2,0,0,1,1,0,1,80,-3,-1,-1,8
0,50
 3060 DATA 2,2,0,0,0,0,0,0,126,-3,-1,-3,
126,80
 3070 DATA 3,2,0,0,1,1,0,1,126,-3,-1,-3,
126,80
 3080 DATA 4,2,0,0,1,1,0,1,90,-3,-1,-3,9
0,50
 3090 DATA 5,2,0,0,1,1,0,1,126,-1,-1,-1,
126,90
 3100 DATA 6,2,0,0,0,0,0,0,112,-3,-1,-3,
112,80
 3110 DATA 7,2,2,-2,0,1,1,0,126,-2,-1,-2
,126,90
 3120 DATA 8,3,2,0,0,200,0,0,16,-1,-1,-1
,126,100
 3130 DATA 9,2,0,0,1,1,0,1,112,-3,-1,-1,
112,80
 3140 REM Channel 1
 3150 REM Pro Coffee F
 3160 DATA V2,R,28
 3170 DATA G3,4
 3180 DATA C4,2,B3,A3,B3,C4,4,A3,4
 3190 DATA G3,A3,E3,G3
 3200 DATA A3,2,G3,F3,4,C4,B3,2,C4
 3210 DATA G3,12,F3,2,E3
 3220 DATA D3,4,A3,G3,F3
 3230 DATA G3,2,F3,E3,F3,G3,4,C4,2,A3
 3240 DATA F3,4,E3,2,F3,G3,4,G3
 3250 DATA C4,16
 3260 DATA V3,C1,2,C2,C1,C2,C1,C2,C1,C2
 3270 REM Wreck the Stalls with Football
 Folly
 3280 DATA V2,<,G3,6,F3,2,E3,4,D3
 3290 DATA C3,D3,E3,C3
 3300 DATA D3,2,E3,F3,D3,E3,6,D3,2
 3310 DATA C3,4,B2,C3,8,>
 3320 REM Jangle Bells
 3330 DATA E4,4,E4,E4,C4,2,E4,4
 3340 DATA E4,D4,2,E4,4,G4
 3350 DATA E4,G4,C4,D4,2,E4,18
 3360:
 3370 DATA F4,4,F4,F4,G4,2,F4,4
 3380 DATA E4,D4,2,E4,4,E4,2,F4
 3390 DATA E4,4,D4,D4,E4,2,V5,D4,8
 3400 DATA G4,D4
 3410 DATA G4,D4
 3420 DATA G4,D4
 3430 DATA G4,4,F4,2,E4,D4
 3440 REM Ding Dong (Eurovision Entry)
 3450 DATA V2,<,C4,4,C4,D4,2,C4,B3,A3
 3460 DATA G3,12,G3,4
 3470 DATA A3,C4,C4,B3
 3480 DATA C4,8,C4,>
 3490 DATA G4,6,F4,2,E4,F4,G4,E4
 3500 DATA F4,6,E4,2,D4,E4,F4,D4
 3510 DATA E4,6,D4,2,C4,D4,E4,C4
 3520 DATA D4,6,C4,2,B3,C4,D4,B3
 3530 DATA C4,6,B3,2,A3,B3,C4,A3
```

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```
 3540 DATA B3,6,A3,2,G3,4,G3
 3550 DATA A3,C4,C4,B3
 3560 DATA C4,6,C4,4,G3,2,A3,4
 3570 DATA V3,E4,32
 3580:
 3590 REM We Three Royal Personages
 3600 DATA V2,<,E4,8,D4,4
 3610 DATA C4,8,A3,4
 3620 DATA B3,C4,B3
 3630 DATA A3,12,>
 3640 DATA C4,8,C4,4
 3650 DATA D4,8,D4,4
 3660 DATA E4,8,E4,4
 3670 DATA G4,F4,E4
 3680 DATA D4,E4,D4
 3690 DATA C4,8,B3,4
 3700 DATA A3,16
 3710 DATA B3,12,E3,4
 3720 REM God Help Ye Gerry Mental Men
 3730 DATA V7,<,E3,B3,2,B3,R,A3,R,4
 3740 DATA G3,4,F#3,2,E3,6,D3,2,R
 3750 DATA E3,4,F#3,2,R,G3,4,A3,2,B3,14
 3760 DATA E3,4,>
 3770 DATA V2,C4,4,A3,B3,C4
 3780 DATA D4,E4,B3,A3
 3790 DATA G3,E3,F#3,G3
 3800 DATA A3,8,G3,4,A3
 3810 DATA B3,8,C4,4,B3
 3820 DATA B3,A3,G3,F#3
 3830 DATA E3,8,G3,2,F#3,E3,4
 3840 DATA A3,8,G3,4,A3
 3850 DATA B3,C4,D4,E4
 3860 DATA B3,A3,G3,F#3
 3870 REM And Finally...
 3880 DATA <,R,32,>
 3890 DATA G#3,16
 3900 DATA A3,4,G#3,G3,G#3
 3910 DATA A3,16
 3920 DATA D#3,2,E3,R
 3930 DATA X
 3940 REM Channel 2
 3950 REM Pro Coffee F
 3960 DATA V1,<,C6,4,C6,C6,C6,>
 3970:
 3980 DATA <,C6,C6,C6,C6
 3990 DATA C6,C6,C6,C6
 4000 DATA C6,C6,C6,C6
 4010 DATA C6,C6,C6,C6,>
 4020 DATA C6,C6,C6,C6
 4030:
 4040:
 4050:
 4060:
 4070 REM Wreck the Stalls with Football
 Folly
 4080 DATA <,R,4,C6,8,C6
 4090 DATA C6,C6
 4100 DATA C6,C6
 4110 DATA C6,C6,4,>
 4120 REM Jangle Bells
 4130 DATA V2,G3,8,G#3
 4140 DATA A3,G#3
 4150 DATA G3,A3,4,G#3
 4160 DATA G3,B3,A3,G3
 4170 DATA A3,8,G#3
 4180 DATA C3,4,B2,C#3,8
 4190 DATA D3,16
 4200 DATA V4,<,G4,1,F#4,G4,A4,B4,A4,G4,
F#4,G4,F#4,G4,A4,B4,A4,G4,F#4
 4210 DATA G4,1,F#4,G4,A4,B4,A4,G4,F#4,G
4,F#4,G4,A4,B4,A4,G4,F#4,>
 4220:
 4230:
 4240 REM Ding Dong (Eurovision Entry)
 4250 DATA V6,<,C3,4,E3,2,G3,G#3,4,F3
 4260 DATA G3,F3,E3,D3
 4270 DATA R,2,F3,4,F3,G3,G3,2
 4280 DATA C5,2,B4,A4,G4,F4,E4,D4,C4,>
 4290 DATA V2,G2,4,B2,C3,A2
 4300 DATA F2,A2,B2,D3
 4310 DATA C3,G2,A2,C3
 4320 DATA D2,A2,B2,A2
 4330 DATA C2,G2,A2,G2
 4340 DATA D2,B2,C3,E2
 4350 DATA F3,A2,C3,G3
 4360 DATA V8,B0,32
 4370:
 4380 DATA V2,E3,4,D3,C3,B2
 4390 REM We Three Royal Personages
 4400 DATA <,E3,12
 4410 DATA F3
 4420 DATA F#3
 4430 DATA F3,>
 4440 DATA V4,A4,1,E4,A4,B4,C5,B4,C5,B4,
C5,B4,A4,E4
 4450 DATA G4,D4,G4,A4,B4,A4,B4,A4,B4,A4
,G4,D4
 4460 DATA G4,E4,G4,A4,B4,C5,B4,G4,C5,B4
,G4,E4
 4470 DATA G4,D4,G4,B4,F4,D4,F4,G4,E4,C4
,E4,G4
 4480 DATA D4,A3,D4,E4,F4,E4,F4,E4,F4,E4
,D4,A3
 4490 DATA E4,D4,E4,G#4,B4,G#4,B4,D5,E5,
D5,C5,B4
 4500 DATA A4,E4,A4,B4,C5,B4,A4,E4,A4,E4
,A4,B4,C5,B4,A4,E4
 4510 DATA E5,F5,E5,D5,C5,D5,C5,B4,A4,C5
,B4,A4,V8,B0,4
 4520 REM God Help Ye Gerry Mental Men
 4530 DATA V6,<,B2,8,C3
 4540 DATA C#3,C3
 4550 DATA B2,C3
 4560 DATA B2,4,F#3,E3,C3,>
 4570 DATA E3,8,F3
 4580 DATA F#3,G3
 4590 DATA B2,A2
 4600 DATA D3,G2
 4610 DATA E3,16
 4620 DATA D#3,8,E3
 4630 DATA B2,A2
 4640 DATA D3,C3
 4650 DATA D3,G3
 4660 DATA D#3,B2
 4670 REM And Finally...
 4680 DATA V9,<,E3,4,E4,C#4,A3
 4690 DATA F#3,B3,G#3,E3,>
 4700 DATA E3,E4,C#4,A3,F#3,B3,G3,E3
 4710 DATA E3,E4,C#4,A3
 4720 DATA V2,A#3,2,B3,R
 4730 DATA X
```

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Get it right!

```
3000 =    0 0
3010 =    0 0
3020 =    0 0
3030 = 9719 9
3040 = B169 B
3050 = E598 A
3060 = 9551 A
3070 = 7740 0
3080 = A526 C
3090 = 7F8A D
3100 = 7E7D 3
3110 =  8E5 C
3120 = D684 3
3130 = 589E B
3140 =    0 B
3150 =    0 B
3160 = AE54 D
3170 = 31FB 1
3180 = D4FD C
3190 = 1062 A
3200 = E6C7 E
3210 = C6DC 5
3220 = C4D9 F
3230 = E9B4 4
3240 = 3976 B
3250 = AC39 7
3260 = CA60 A
3270 =    0 A
3280 = 9C86 2
3290 = C55F 2
3300 = A7EB 3
3310 = 5B21 D
3320 =    0 D
3330 = C530 0
3340 = 8F53 6
3350 = 46CA 7
3360 = 9719 F
3370 = 7A6C 0
3380 = A929 4
3390 = 98F8 E
3400 = F2D1 5
3410 = F2D1 2
3420 = F2D1 D
3430 = 5AC7 E
3440 =    0 E
3450 = 3C75 4
3460 = 7169 A
3470 = 1429 A
3480 = 8C55 1
3490 =  419 3
3500 = B0FE B
3510 = 6FCA 1
3520 = 388F 6
3530 = F556 C
3540 = 3660 B
3550 = 1429 1
3560 = BF45 B
3570 = D726 9
3580 = 9719 7
3590 =    0 7
3600 = 2238 E
3610 = 45E7 D
3620 =  333 6
3630 = 1F1D D
3640 = 2D1F 6
3650 = CD99 0
3660 = 500E 1
3670 = 98EE A
3680 = 8D78 5
3690 = DE3B 4
3700 = B997 9
3710 = 5E71 F
3720 =    0 F
3730 = DCD8 D
3740 = 84B3 7
3750 = 3609 E
3760 = 7786 6
3770 = 121C 8
3780 = AF39 1
3790 = 401A A
3800 = 3A60 D
3810 = 632B F
3820 = C7A3 A
3830 = DAAA 1
3840 = 3A60 1
3850 = E277 E
3860 = C7A3 A
3870 =    0 A
3880 = D961 C
3890 = 2930 3
3900 = CB22 4
3910 = B997 0
3920 = 4B57 4
3930 = CDEE 4
3940 =    0 4
3950 =    0 4
3960 = 8447 3
3970 = 9719 0
3980 = 5D38 8
3990 = 98F5 8
4000 = 98F5 A
4010 = BAEE 7
4020 = 98F5 6
4030 = 9719 E
4040 = 9719 1
4050 = 9719 E
4060 = 9719 5
4070 =    0 5
4080 = 415F F
4090 = 2F6A B
4100 = 2F6A 6
4110 = 4A05 C
4120 =    0 C
4130 = 2D59 3
4140 = 31EC 3
4150 = C488 4
4160 = 5111 2
4170 = F7DA 8
4180 = D6BC 4
4190 = 9AC0 8
4200 = AE73 9
4210 = EC99 F
4220 = 9719 9
4230 = 9719 2
4240 =    0 2
4250 = 73AB 1
4260 = 8229 F
4270 = 46D1 F
4280 = 63D4 D
4290 = C06E E
4300 = 5B3C 0
4310 = 4AF9 5
4320 = 145B 0
4330 = F959 F
4340 = CC0F 5
4350 = BDCF 4
4360 = 312C A
4370 = 9719 0
4380 = 2424 8
4390 =    0 8
4400 = 1EF8 A
4410 = C0AD E
4420 = 710F 0
4430 = E605 5
4440 = CE77 5
4450 = 9654 6
4460 = 3D44 7
4470 = EA80 9
4480 = CA03 2
4490 = 627B A
4500 = DE8A 2
4510 =  E23 6
4520 =    0 6
4530 =  5CD 7
4540 = 110F 3
4550 = 1F6F 7
4560 = F97E 5
4570 = 4082 4
4580 = 9ECA F
4590 = 692C 3
4600 = 78BB 8
4610 = 3091 6
4620 = C184 D
4630 = 692C 1
4640 = A45E A
4650 = 689A C
4660 = FA5E A
4670 =    0 A
4680 = 802B C
4690 = A181 0
4700 = E983 4
4710 = 3962 1
4720 = F0B2 6
4730 = CDEE F
4740 =    0 F
4750 =    0 F
4760 = 9078 6
4770 = 9719 1
4780 = 89D6 E
4790 = 4C1B 6
4800 = 4C1B 5
4810 = 7FED C
4820 = 4C1B A
4830 = 9719 E
4840 = 9719 B
4850 = 9719 B
4860 = 9719 C
4870 =    0 C
4880 = EB85 A
4890 = BC44 5
4900 = 6B93 0
4910 = 8627 B
4920 =    0 B
4930 = 99D7 6
4940 = 9719 F
4950 = A156 E
4960 = BC44 9
4970 = 7681 4
4980 = B1B0 D
4990 =  D03 A
5000 = 4B40 F
5010 = 7681 2
5020 = 30C2 5
5030 =  D03 E
5040 =    0 E
5050 = 3EE9 F
5060 = 4B40 1
5070 = 707B F
5080 = 6962 A
5090 = BC44 4
5100 = 707B F
5110 = A156 D
5120 = 4B40 3
5130 = 7681 7
5140 = 50A8 1
5150 = 2E51 E
5160 = BC44 0
5170 = 30C2 7
5180 = 92EA 6
5190 =    0 6
5200 = 7CCD 9
5210 = 933E B
5220 = 933E 7
5230 =  E33 7
5240 = 933E 2
5250 = EC09 0
5260 = 49CC 1
5270 = 4898 0
5280 = 5B82 7
5290 = 36FB E
5300 = C7C6 B
5310 = 3EB1 6
5320 =    0 6
5330 = AF7D 4
5340 = 30C2 A
5350 = BC44 5
5360 =  57F 8
5370 = 88F4 B
5380 = FB16 D
5390 = 92EA 2
5400 = 1257 7
5410 = 716B 3
5420 = C6B0 3
5430 = 92EA B
5440 = ACBF 4
5450 = A619 0
5460 = C6B0 9
5470 =    0 9
5480 = 366C 7
5490 =  748 2
5500 = 366C 7
5510 = 30C2 7
5520 = 35FB 3
5530 = CDEE 5
```

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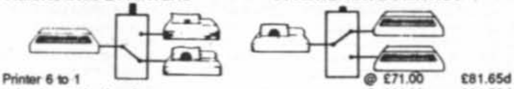

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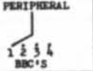

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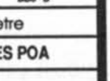

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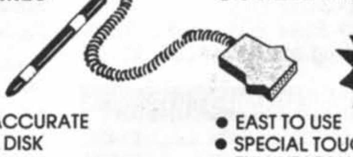

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◀ *From Page 138*

```
4740 REM Channel 3
4750 REM Pro Coffee F
4760 DATA V1,<,E5,4,E5,E5,E5,>
4770:
4780 DATA <,E5,E5,E5,E5
4790 DATA E5,E5,E5,E5
4800 DATA E5,E5,E5,E5
4810 DATA E5,E5,E5,E5,>
4820 DATA E5,E5,E5,E5
4830:
4840:
4850:
4860:
4870 REM Wreck the Stalls with Football
Folly
4880 DATA V3,<,C1,2,C2,C1,C2,C1,C2,C1,C
2
4890 DATA C1,C2,C1,C2,C1,C2,C1,C2
4900 DATA F1,F2,F1,F2,C1,C2,C1,C2
4910 DATA F1,F2,G1,G2,C1,C2,C1,C2,>
4920 REM Jangle Bells
4930 DATA <,C1,C2,C1,C2,C1,C2,C1,C2,>
4940:
4950 DATA C1,C2,C1,C2,F1,F2,F1,F2
4960 DATA C1,C2,C1,C2,C1,C2,C1,C2
4970 DATA F1,F2,F1,F2,F1,F2,F1,F2
4980 DATA C1,C2,C1,C2,A1,A2,A1,A2
4990 DATA D1,D2,D1,D2,D1,D2,D1,D2
5000 DATA G1,G2,G1,G2,G1,G2,G1,G2
5010 DATA F1,F2,F1,F2,F1,F2,F1,F2
5020 DATA E1,E2,E1,E2,E1,E2,E1,E2
5030 DATA D1,D2,D1,D2,D1,D2,D1,D2
5040 REM Ding Dong (Eurovision Entry)
5050 DATA <,C1,C2,C1,C2,F1,F2,F1,F2
5060 DATA G1,G2,G1,G2,G1,G2,G1,G2
5070 DATA F1,F2,F1,F2,G1,G2,G1,G2
5080 DATA C1,C2,D1,D2,E1,E2,C1,C2,>
5090 DATA C1,C2,C1,C2,C1,C2,C1,C2
5100 DATA F1,F2,F1,F2,G1,G2,G1,G2
5110 DATA C1,C2,C1,C2,F1,F2,F1,F2
5120 DATA G1,G2,G1,G2,G1,G2,G1,G2
5130 DATA F1,F2,F1,F2,F1,F2,F1,F2
5140 DATA G1,G2,G1,G2,C1,C2,C1,C2
5150 DATA F1,F2,F1,F2,C1,C2,G1,G2
5160 DATA C1,C2,C1,C2,C1,C2,C1,C2
5170 DATA E1,E2,E1,E2,E1,E2,E1,E2
5180 DATA E1,E2,D1,D2,C1,C2,B0,B1
5190 REM We Three Royal Personages
5200 DATA <,A1,A2,A1,A2,A1,A2
5210 DATA A1,A2,A1,A2,A1,A2
5220 DATA A1,A2,A1,A2,A1,A2
5230 DATA A1,A2,A1,A2,A1,A2,>
5240 DATA A1,A2,A1,A2,A1,A2
5250 DATA G1,G2,G1,G2,G1,G2
5260 DATA C1,C2,C1,C2,C1,C2
5270 DATA B1,B2,A1,A2,G1,G2
5280 DATA D1,D2,D1,D2,D1,D2
5290 DATA E1,E2,E1,E2,E1,E2
5300 DATA A1,A2,A1,A2,A1,A2,A1,A2
5310 DATA B1,B2,A1,A2,G1,G2,F#1,F#2
5320 REM God Help Ye Gerry Mental Men
5330 DATA <,E1,E2,E1,E2,E1,E2,E1,E2
5340 DATA E1,E2,E1,E2,E1,E2,E1,E2
5350 DATA C1,C2,C1,C2,C1,C2,C1,C2
5360 DATA B0,B1,B0,B1,B0,B1,B0,B1,>
5370 DATA A1,A2,B1,B2,C1,C2,D1,D2
5380 DATA B0,B1,C1,C2,D1,D2,D#1,D#2
5390 DATA E1,E2,D1,D2,C1,C2,B0,B1
5400 DATA A1,A2,G1,G2,D1,D2,D#1,D#2
5410 DATA E1,E2,F#1,F#2,G1,G2,A1,A2
5420 DATA B1,B2,B1,B2,C#1,C#2,D#1,D#2
5430 DATA E1,E2,D1,D2,C1,C2,B0,B1
5440 DATA A1,A2,D1,D2,E1,E2,F#1,F#2
5450 DATA G1,G2,A1,A2,B1,B2,C1,C2
5460 DATA B1,B2,B1,B2,C#1,C#2,D#1,D#2
5470 REM And Finally...
5480 DATA <,E1,E2,E1,E2,E1,E2,E1,E2,>
5490 DATA V9,<,E1,E2,E1,E2,E1,E2,E1,E2,
>
5500 DATA <,E1,E2,E1,E2,E1,E2,E1,E2,>
5510 DATA E1,E2,E1,E2,E1,E2,E1,E2
5520 DATA V2,D#2,2,E2,2,R
5530 DATA X
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LETTERS

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New look at View problems

THERE are simple answers to two queries in the October Letters regarding View.

To test print a short paragraph without wasting paper, set the page length to the number of lines plus two (to allow for the header and footer) and set the top and bottom header and footer margins to zero.

To use extra roms like Viewsheet and Viewstore on a BBC B, an external cartridge socket (such as Care or Viglen) is much cheaper than a sideways rom board.

One small snag is that neither will take the piggy-back eprom used for products like Interword or Spellmaster unless you leave the lid off the cartridge. Even then, the cartridge will be too bulky to fit into the Care socket, because the cartridges go in horizontally with the fat side downwards.

I got round the problem by prising the Care socket apart with screwdrivers and refitting the inside bit upside-down

Also on the subject of View, it is wrongly stated in another letter, and in Will Gallagher's article in the July issue of The Micro User, that a Basic or assembler program written in View needs to be saved to disc by the WRITE rather than the SAVE command. There is nothing wrong with the SAVE command, and it is much faster.

Neither is it necessary to produce a pure Ascii file before you *EXEC it. The View file can begin with a series of edit commands, and even plain text lines as long as they precede the AUTO command.

When you *EXEC such a file they will be rejected as mistakes and ignored by View or (if they follow the *BASIC command) by the Basic interpreter.

Two advantages are that you can start with a ruler without < at the end to prevent formatting and you can have several lines describing what the program does instead of using up space in REMs in the Basic part.

By the way, if writing machine code in View, it's quite OK to use tabs to separate the columns. They seem to disappear when you *EXEC the file.

Now an appeal for information. I'm looking for some software to use the Master's sideways ram as a silicon disc. Having used Watford's rom/ram board on a BBC model B, I know how it speeds up the work of SAVEing and EXECing the files.

Beebug's Master Rom, to my great disappointment, won't save text files direct from View to the silicon disc. Does anyone know of something that will? – **Laurence Wright, University College of North Wales, Bangor.**

Memory locations

IN the September issue of The Micro User, Mike Cook's Problem Solved advised Mr McCartney that he could not read the memory locations at &8000 through to &BFFF while in Basic or while the DFS is paged in.

This is not strictly true as there is an operating system call, osrdrm accessed through location &FFB9 that can read the contents of any of the 16 rom sockets (if fitted – without having to use machine code or the rom latch at &FE30.

The call is quite simple to set up from Basic by pointing memory locations &F6 and &F7 to the memory location you wish to interrogate, then setting the Y register to the rom socket number by using Y%.

The contents of the location read is returned in the A register. So by using USR, then masking out the unwanted bits it is possible to assign the value returned to a variable by using a simple function:

```
1000 DEF FNread rom(locati
on, socket)
1010 ?&F6 = location MOD 2
56
1020 ?&F7 = location DIV 2
56
1030 Y% = socket
1040 = USR &FFB9 AND &FF
```

– **A.S. Knights, Watford, Herts.**

C review update

LAST month's review on the three versions of C did not contain the full details of the Beebug C package as the review copy was pre-production.

The complete Beebug manual is over 150 pages and contains full details of each library function, as does the Acornsoft manual – the Brasscourt implementation provides very few library routines. The stand-alone run code for the Beebug C is available for £20.

It was not made clear in the review, but the Acornsoft implementation does not produce stand alone code either and there is no mention of any program to allow the Acornsoft C code to run away from the system.

The Beebug version is much faster than the Acornsoft implementation, and it produces a much more compact code. The reason for this is that the Acornsoft version compiles all the functions in a given library whether used or not, whereas the Beebug implementation only compiles the routines that are actually required.

In my opinion the Beebug version is a much better buy than the Acornsoft version and I would definitely recommend it. On further consideration from last month I feel that the Brasscourt version should not be touched by anyone wishing to learn how to program in C. – **Steve Turnbull**

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Writers of the most interesting letters receive a £10 prize.

Printer calls the timer

I TYPED in the game Ayo from the January issue of The Micro User. It works very well, but to my surprise only when my printer is also on: Without the printer the game stops in the middle of the formation of the screen display.

Can you advise me on this problem? – **Dr. F. van der Veen, The Netherlands.**

● It would seem that you are issuing a VDU2 command somehow. Make sure every VDU23 in the program has the correct numbers following them.

Detecting files

AFTER reading Andrew Rojek's letter in the September issue of The Micro User asking if it is possible to detect files with ! as the first character I wrote this procedure.

It uses osgbpb (address

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LETTERS

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&FFD1) with A=8 to get filenames from the current directory, tests if the first character is ! and if appropriate stores the name in the array FIL$. The listing includes a short demo which prints the names out.

Unfortunately this system only reads the current directory.

```
  10 DIMPR%15,FLS%12,FIL$(
48)
  20 PROCgfiles
  30 FOR N%=0 TO file%:PRI
NTFIL$(N%);:NEXT
  40 END
1000 DEFPROCgfiles
1010 X%=PR% AND255:Y%=PR%
DIV256:A%=8
1020 file%=0:filenum%=-1:R
EPEAT filenum%=filenum%+1
1030 PR%!1=FLS%:PR%!5=1:PR
%!9=filenum%:?FLS%=0:CALL&
FFD1
1040 A$="":FOR V%=FLS%+1 T
O FLS%+10:A$+CHR$?V%:NEXT
1050 IF LEFT$(A$,1)="!" FI
L$(file%)=A$:file%=file%
+1
1060 UNTIL?FLS%=0
1070 ENDPROC
```

– **Mathew Mason, Bexhill-on-sea, East Sussex.**

Ceefax utility snag

HAVING typed in and re-checked all the listing lines, in the Ceefax utility printed in the October issue of The Micro User *I came across a problem with line 1390.*

When running the program, it sometimes gives mistake at line 1390. Most of the line is OK except the AND&DF, which seems to cause the error.

Your help would be appreciated as the program is very useful when it runs. – **M. Cheesley, Ringmor, East Sussex.**

● This problem occurs with certain teletext roms on certain BBC Micros. To correct it put in a new line 1:

```
1*TTXON
```

Printing listings

HERE's one of those simple tips you never see written down in instruction books.

When printing listings from the screen you usually get the LIST (or L.) command as well. You can avoid this by using the following routine:

Switch on the printer. Then Type L. but do not press Return. Hold down the Control key, press B and release, then press Return. At the end press Control+A, Control+L and Control+C to produce a form feed and disable the printer. – **Peter Jennings, St. Albans, Herts.**

Switching modes

I WONDER if any of your readers would be interested in how to change mode during a procedure. I've found it very useful when writing arcade-type games programs, because you can change from the graphics in Mode 2, for example, to Hall of Fame in Mode 7.

The MODE command on it's own gives the "Bad Mode" error message yet VDU 22, which I thought was exactly the same, works with no problem.

Please could you tell me why this is, as I assumed that MODE and VDU 22 did exactly the same thing. Is it a bug? – **Colin Foster, Coundon, Coventry.**

● This is not a bug. When in a procedure or function Basic stores data on the Basic stack immediately below the screen memory. The MODE command checks whether there is data on the stack before issuing the VDU22 command. If there is data on the stack then an error is generated.

On the second processor you can use MODE within procedures, but you can't using shadow ram on a B+ or Master. This last situation is a bug.

Passing on the pauses

PRINTING multipage documents can be time consuming with daisywheel printers and tedious when this holds up further typing or editing. When using individual sheet feed the word processor is normally set to pause at each page end to allow the printer to be fed with the next sheet.

So even if you have a large capacity print buffer, such as provided with the Watford Shadow Ram, this cannot be effectively used if the word processor output is paused. And so further editing or filing is held up until printing is complete.

One solution is to make the printer do the pausing, so the word processor operates without pause and passes all its output into the buffer. To do this, you can use the facility, provided with most word processors, to define a customised footer which is printed at the bottom of each page.

£10 Prize letter

If the footer contains a form feed code (10) followed by a printer halt code (19 for Juki and most printers), then the paper will be ejected and the printer stopped after each page. After feeding in a new sheet the printer can be restarted manually with the reset or online button.

The footer can contain other printable character codes, but it is obviously important that these are placed before the line feed and printer halt codes, otherwise they will be printed at the top of the next page. Also for the same reason the footer must be positioned on the last line of the bottom margin, otherwise extra line spaces will occur on the next page.

The following codes work with Wordwise Plus or Mini Office II and a Juki printer (where [indicates the start embedded command marker):

```
[ep[dm[fp6[df[oc10,19,27,58
```

The escape code 27,58 causes the printer to ignore the following return code which Wordwise sends after the end of every footer. Alternatively code 27,12 (negative line feed) can be used to effectively cancel any unwanted line feed.

It is very nice to see 10 minutes' worth of printing quickly disappearing into the print buffer followed by the return of the editing menu. – **A.L. Gouch, Sheffield.**

Function key tips

PROMPTED by Mick Gregson's letter in the October issue of The Micro User *here are some of the function key wrinkles that I use with InterWord:*

```
*KEY 5 |!|Q|M|M|M|M|!-|!-|!-|[
```

gives green text on black background – my preferred screen configuration. Or, as an alternative:

```
*KEY 6 |!|Q|M|M|M|M|!-|M|!,|[
```

gives the currently popular paper white screen. These two certainly save a lot of key presses whenever InterWord is entered.

Another tokenised key definition that I use frequently is:

```
*KEY 7 |!|V|!/|Mcodes1|M
```

which quickly loads my control code sequence (previously saved as codes 1) into menu 6. Within this sequence is another time saver. I am a user of CJE Micro's Fontaid and always used to use 27,37,1 and 27,37,0 as the embedded commands to switch in and out of a previously downloaded font. Now, however, these commands are defined as the dotted underline control code and consequently become simpler to use and those words or blocks of text in the alternative font are visible on screen.

While on the subject of

Fontaid, the downloading commands can be entered before printing with a key definition from the main menu:

```
*KEY 9 *FONTL F. GRKMTH|M
```

Finally one that should work but doesn't

```
*KEY 8 |!#|I|!&|!#|!,|!|D
```

This is the equivalent of f3 (insert marker), Tab.f6 (align right, f3 (insert marker), cursor left, Shift+f4 (underline) and should produce a single continuous line across the page as it does when entered as the sequence of keypresses just given.

However, for some reason the Tab part of the key definition does not allow any further tokens to be recognised. Can anyone explain why? – **Tony Schonfeld, London.**

Rom in the way

AS an owner of a BBC B, an AMX Mouse and Pagemaker and also your highly acclaimed Mini Office II, I feel I should let you know that the spreadsheet program will not work with the Pagemaker roms installed.

*If I owned a Master this would be no great problem because I could simply *UNPLUG the offending rom. However as I have a model B with no UNPLUG command I use the following poke:*

```
?&2AX=0
```

where X=the number of the rom socket+1. So ?&2AF=0 would disable the rom in socket R and this works fine until you press Break.

But as you have to !BOOT up the Mini Office II disc I have written this short program:

```
10 ?&2A(X)=0
20 PRINT"Insert MINI OFFIC
E Disc Now and Press SPACE
"
30 REPEAT:UNTIL GET=32
40*RUN !BOOT
```

Replace (X) with the socket number of the offending rom. – **Andrew G Westthorp, Lanchester, Durham.**

Generating new discs

£10 Prize letter

THE excellent Disc Cataloguer from the May issue of The Micro User *arrived at an opportune time: My collection of discs was crying out for an indexing system.*

However, from bitter experience, I know that in situations where a new disc has to be generated from a master disc from time to time, it is easy to forget the procedure for making the new disc, particularly if this involves manipulating more than one file.

The following simple modifications will allow the user of a dual disc system to simply insert the master file disc into drive 0, an appropriately formatted, but blank disc in drive 1, and press Shift+Break. The necessary files will then be created on the new disc and LOCKed as needed, leaving the disc ready to be used.

The master file disc should contain the following files: Catalog, Search, Multcod, Setup, !Boot, and a new file called !B. All these should be locked except !B. In SETUP delete line 360, and add the following lines:-

```
275 *ACCESS SP L
360 PRINTAB(0,10)CHR#134"R
EMOVE MASTER DISC FROM DRI
VE 0, AND"
361 PRINTTAB(0,11)CHR$134"
REPLACE WITH PROGRAM DISC
FROM DRIVE1"
362 PRINTTAB(0,13)CHR#130"
PressSHIFT-BREAK to run CA
TALO
G"
363 PRINTTAB(0,16)CHR$129"
NB! Remember that all disc
 to be"
364 PRINTTAB(0,17)CHR$129"
catalogued on this disc MU
ST conform"
365 PRINTTAB(0,18)CHR$129"
to the format which was sp
ecified when"
366 PRINTTAB(0,19)CHR$129"
the PROGRAM disc was initi
lised"
```

The !BOOT file should be changed to:

```
*BASIC
*COPY 0 1 CATALOG
*COPY 0 1 SEARCH
*COPY 0 1 MULTCOD
*COPY 0 1 !B
*RENAME :1.!B :1.!BOOT
*DRIVE 1
*ACCESS !BOOT L
CHAIN ":0.SETUP"
```

And the !B file is simply:

```
*BASIC
CHAIN "CATALOG"
```

It is important that this file is NOT locked.

Happy cataloguing! – **H.L. Smith, Little Bealings, Woodbridge.**

We got it right!

IN the July issue of The Micro User *the Get it Right! listing of the checksum for Diamond Quest does not produce the same line result as the program line 420 when typed from page 141.*

Everything works at the moment, and only having reached screen two, I don't know what will happen when the fifth screen has been completed. – **S. Moorcroft, Dukinfield, Cheshire.**

● There are no errors in the program or checksums: It looks as though you may have mixed up the lower case letter L with the number 1.

Delaying discs

*I OWN a BBC Master Compact and I am getting increasingly frustrated with my disc drive. Every time I change a disc I have to *MOUNT the new disc. This is very time-consuming when using two discs – a system one and another for saving files – and having only one disc drive.*

Can you suggest a method by which this problem may be solved and stop my seemingly never ending frustration? – **Simon Tebb, Ecclesall, Sheffield.**

● One solution would be to program a function key to issue *MOUNT command, for example:

```
*KEY9*MOUNT|M
```

Sideways ram loading

AS a regular reader of your letters pages, I have noticed several items on loading and booting in and out of sideways ram. I have a B+128 and find it very useful to load and run rom images from sideways ram using a !BOOT file.

For example, to load four rom images and then run a program, the !BOOT file would be made up as follows:

```
1 *SRLOAD ROM1 8000 W
2 *SRLOAD ROM2 8000 X
3 *SRLOAD ROM3 8000 Y
4 *SRLOAD ROM4 8000 Z
5 *KEY10 CH."A" M
6 CALL!-4
```

where 8000 is the load address in hex and W,X,Y,Z are the four 16k banks of sideways ram. The Basic program A, programmed into the user-definable Break key, would be a simple one-liner:

```
10 *ROM1
```

and the CALL command is a simulated pressing of Break.

The rest of the user-definable keys can of course be programmed from the file, however, the CALL!-4 must be the last command. A little bit of experimenting with a !BOOT file can save a lot of tedious

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LETTERS

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typing to load images into sideways ram. – **G. Dobson, R.A.F. Bruggen.**

● This will not work on a Master where you need *FX151,78,127 before the CALL!-4. On a Compact you can add the I parameter at the end of each SRLOAD command for instant initialisation if the rom image does not take workspace – that is if it is a simple application or language.

Disc copy update

IN my block disc copy utility which you published in the September issue of The Micro User *there was a small error causing it not to work properly on an Acorn DNFS 1.2, which uses different addresses to store the disc drive selection flags than those on earlier disc filing systems.*

The simplest solution, which will work on any Acorn compatible DFS, is to use oscli to set the drive. This involves the minor alteration of only six lines in the program plus the addition of a short routine to carry out the oscli call, as follows:

```
100  oscli=&FFF7
300  LDA adrive:JSR set dr
ive
1010 LDA adrive:JSR set dr
ive
2100 LDA bdrive:JSR set dr
ive
2950 JSR oswrch:STA adrive
3030 JSR oswrch:STA bdrive
3041 :
3042 STA mem+3
3044 LDX #mem MOD256:LDY #
mem DIV 256
3045 JMP oscli
3046.mem
3047 OPT FNEQUS("DR.2"):OP
T FNEQUB(13)
```

Another minor improvement is as follows:

```
360  JMP fini
2685 .fini
```

This is simply to guarantee that the computer is returned to normal in all circumstances on exit from the routine.

The program may then be renumbered and should work OK. – **John Kelk, Falkirk.**

Loading into shadow memory

CAN you give me the solution to a problem that I have encountered on a project for my college?

If you save a Mode 0,1 or 2 screen from memory to disc or tape using

```
*SAVE Screendump_ 3000 8000
```

*how do you load it back into a B+'s shadow memory after typing *SHADOW and MODE 0? If you try to *LOAD it back in at &3000 the screen is not loaded into shadow memory.*

– **J.M. Fielder, Ramsgate, Kent.**

● As far as we can discover there is no way to *LOAD into shadow memory on the B+. Do any of our readers have a solution?

Printing problems

IF I wish to print anything on my Epson RX80 printer I have to first use the commands:

**FX6,0*
**FX6,12*

I have to do this every time I want to print a page and I have not yet found out how to print a program listing.

Can you help me to overcome this irritating problem because I can't get help from shops who seem happy to sell you a machine but unwilling to advise with problems? – **Kath Gillespie Sells, London.**

● You'll find that you only need *FX6,0 to enable the printing from the word processor – but since you have a Master use this command.

```
*CONFIGURE NOIGNORE
```

Press Control+Break and from then on you won't need *FX6,0 either. If you press Control+B all further screen output is copied to the screen so just LIST your program. Turn off the printer with Control+C.

Short of blanks

I HAVE a model B with a View 3.0 rom inserted and have been given an Oki Microline 82A printer which works fine when just listing Basic programs but does not allow me to enter blank lines between lines of text when using View. Do I need a special printer driver?

Also, is it possible to change or add a chip to make my printer Epson compatible?

– **B.M. Besbrode, Ilford, Essex.**

● All you need to do is type *FX6,0 from the command screen before you print. If this doesn't work put a space on each blank line.

While it may be possible to upgrade your printer the cost would be prohibitive and the drive mechanism for the print head is not capable of the small movements required for special effects.

Who pays for research?

"TO buy or not to buy? That is the question, whether tis' nobler to suffer the bugs, misprints and updates of optimistic programmers and sales reps, or wiser to wait for others to evaluate the product at their own expense. That indeed is the question."

This Willie Spokeshave quotation came to mind as I was looking through my letter files recently and I was appalled to see the number of times I have had to send faulty goods back to suppliers with letters of complaint and the number of times I have had to phone in to find out what has happened to them.

Most firms have a special phone system to deal with people like me, and it works like this: I phone the numbers and get no reply, I let it ring and still get no reply, I redial to find it engaged and it remains that way until lunch time then, back to no reply.

When we are dealing with computer products, it would seem reasonable to expect these firms to have computer control of stock and customers. But on the odd occasion I have made contact with a firm it has been possible to hear the paper shuffling going on in the background as they try to find my order.

From a producer's point of view I can see the system works very well: Make the product, sell it, wait for the customer to evaluate it, read the complaints, modify the product and tell the customer that he needs an update for which he will be required to pay about one third of the original price. Result, research and development paid for by the customer. – **J.W. Pennington, Peacehaven, East Sussex.**

Preview's the trick

FROM time to time do your Wordwise Plus programs which have previously worked well thrown up the error Can't execute? This is nothing to do with a segment program trying to operate on itself (which always produces this message).

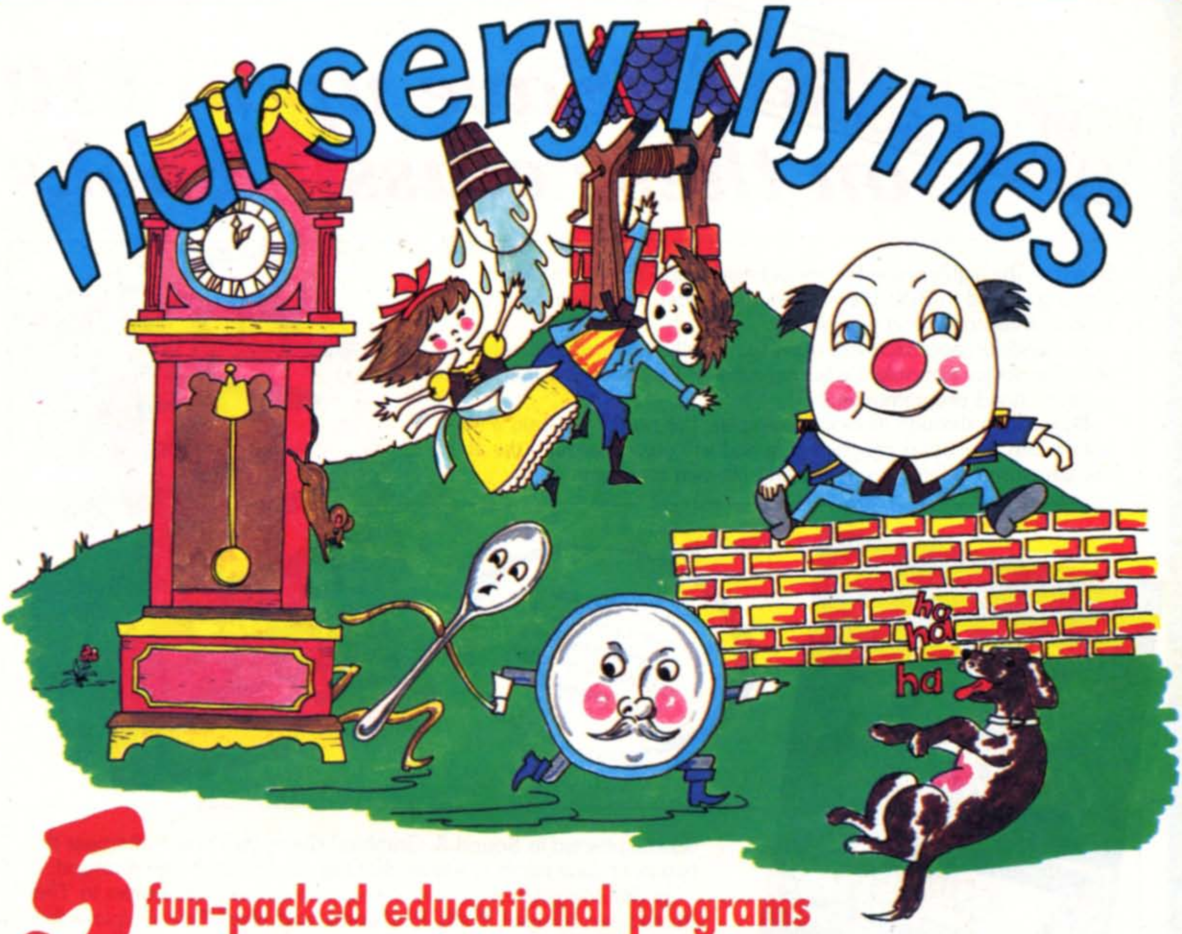
Most likely you have just printed something and Escaped or pressed Break during printing. Sure enough, the program refuses to perform its usual magic.

If this happens Preview your text and/or the segment program and try again. On most occasions this will do the trick. – **Rob Barnes, University of East Anglia, Norwich.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.



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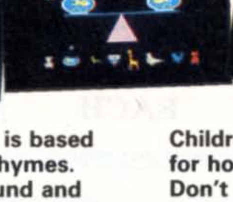

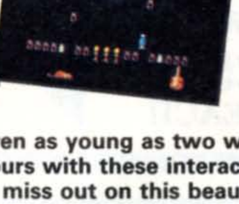

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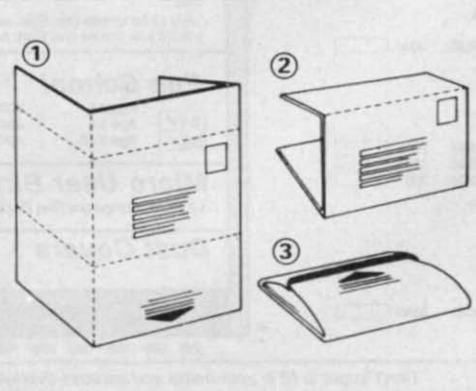

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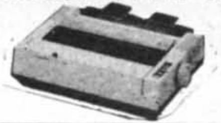

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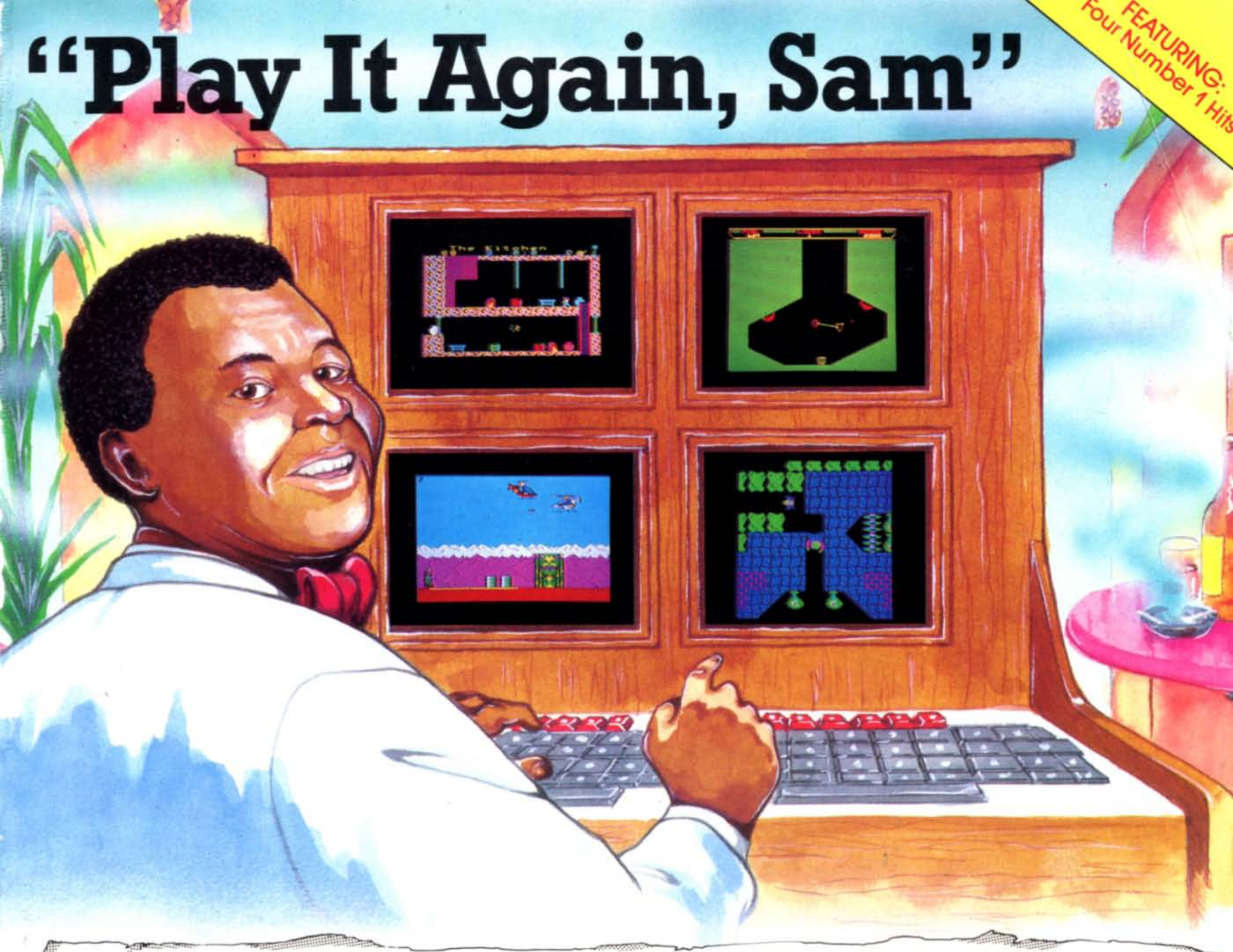

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The Life Of Repton

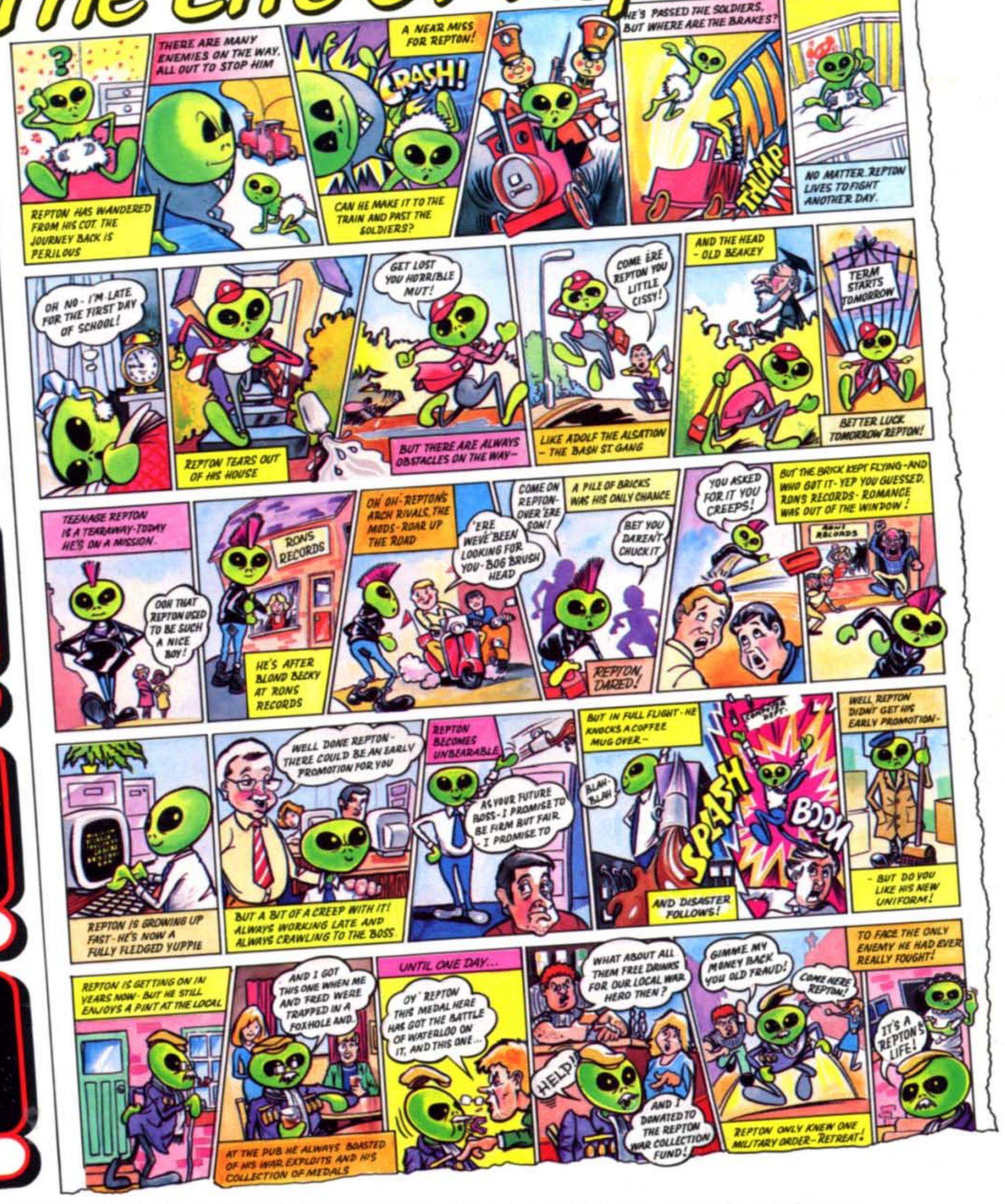
REPTON AS A BABY

REPTON AT SCHOOL

REPTON AS A TEENAGER

REPTON AT WORK

REPTON AS AN OLD MAN


REPTON HAS WANDERED FROM HIS COT. THE JOURNEY BACK IS PERILOUS
THERE ARE MANY ENEMIES ON THE WAY, ALL OUT TO STOP HIM
CAN HE MAKE IT TO THE TRAIN AND PAST THE SOLDIERS?
A NEAR MISS FOR REPTON!
CRASH!
HE'S PASSED THE SOLDIERS, BUT WHERE ARE THE BRAKES?
THUMP
NO MATTER. REPTON LIVES TO FIGHT ANOTHER DAY.
OH NO - I'M LATE FOR THE FIRST DAY OF SCHOOL!
REPTON TEARS OUT OF HIS HOUSE
GET LOST YOU HORRIBLE MUT!
BUT THERE ARE ALWAYS OBSTACLES ON THE WAY-
COME 'ERE REPTON YOU LITTLE CISSY!
LIKE ADOLF THE ALSATION - THE BASH ST GANG
AND THE HEAD - OLD BEAKEY
TERM STARTS TOMORROW
BETTER LUCK TOMORROW REPTON!
TEENAGE REPTON IS A TEARAWAY-TODAY HE'S ON A MISSION.
OOH THAT REPTON USED TO BE SUCH A NICE BOY!
RONS RECORDS
HE'S AFTER BLOND BECKY AT RONS RECORDS
OH OH - REPTON'S ARCH RIVALS, THE MODS - ROAR UP THE ROAD
'ERE WE'VE BEEN LOOKING FOR YOU - BOG BRUSH HEAD
COME ON REPTON - OVER 'ERE SON!
A PILE OF BRICKS WAS HIS ONLY CHANCE
BET YOU DAREN'T CHUCK IT
REPTON, DARED!
YOU ASKED FOR IT YOU CREEPS!
BUT THE BRICK KEPT FLYING - AND WHO GOT IT - YEP YOU GUESSED, RON'S RECORDS - ROMANCE WAS OUT OF THE WINDOW!
RONS RECORDS
REPTON IS GROWING UP FAST - HE'S NOW A FULLY FLEDGED YUPPIE
WELL DONE REPTON - THERE COULD BE AN EARLY PROMOTION FOR YOU
BUT A BIT OF A CREEP WITH IT! ALWAYS WORKING LATE AND ALWAYS CRAWLING TO THE BOSS.
REPTON BECOMES UNBEARABLE
AS YOUR FUTURE BOSS - I PROMISE TO BE FIRM BUT FAIR - I PROMISE TO
BUT IN FULL FLIGHT - HE KNOCKS A COFFEE MUG OVER-
BLAH-BLAH
COMPUTER DEPT.
SPLASH
BOOM
AND DISASTER FOLLOWS!
WELL REPTON DIDN'T GET HIS EARLY PROMOTION-
- BUT DO YOU LIKE HIS NEW UNIFORM!
REPTON IS GETTING ON IN YEARS NOW - BUT HE STILL ENJOYS A PINT AT THE LOCAL
AND I GOT THIS ONE WHEN ME AND FRED WERE TRAPPED IN A FOXHOLE AND.
AT THE PUB HE ALWAYS BOASTED OF HIS WAR EXPLOITS AND HIS COLLECTION OF MEDALS
UNTIL ONE DAY...
OY' REPTON THIS MEDAL HERE HAS GOT THE BATTLE OF WATERLOO ON IT, AND THIS ONE...
WHAT ABOUT ALL THEM FREE DRINKS FOR OUR LOCAL WAR HERO THEN?
HELP!
AND I DONATED TO THE REPTON WAR COLLECTION FUND!
GIMME MY MONEY BACK YOU OLD FRAUD!
COME HERE REPTON!
TO FACE THE ONLY ENEMY HE HAD EVER REALLY FOUGHT!
IT'S A REPTON'S LIFE!
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